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SCIENCE FICTION

FEBRUARY 1949

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BACK HUMAN BEING

YOU WERE NOT EVOLVED FOR SPACE

YOUR PLACE IS EARTH

YOU WILL DIE ALONE

BACK ADVENTURER

BACK

SEETEE SHOCK

BY WILL STEWART



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W2ZGU

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RADIATION AND MUTATIONS

One of the problems of natural, acute, and immediate interest to the atomic scientists, medical men, and biologists working around the atomic piles has been the question of radiation-induced mutations. The problem is of scientific interest—and also, and pressingly, of decidedly personal interest. Until recently, knowledge in the field was so sketchy that, in essence, one could say that radiation definitely did cause mutations, but no one could say what the limitations were. That is, while .1 r-units per day was an acceptable, safe dosage so far as the adult human being was concerned, there was some fear—and no knowledge—that mutations could result even below that threshold. An adult's body tissues can, of course, repair and replace themselves on a statistical basis; an individual germinal cell, however, is not a statistic—it's an entity. It seemed possible that there was no threshold for mutation—that a germinal cell altered by radiation was altered, period.

Dr. Robley D. Evans, of M.I.T.

recently gave a highly interesting talk on this precise subject, summarizing the present knowledge, and reaching some highly important conclusions. Briefly summarizing his summary—(the original paper will appear shortly, I understand, in *Nucleonics*, and it's recommended reading), it appears that the following general rules hold:

1. There is a threshold. Radiation intensities of the order of .1 r-units per day do not appreciably alter the naturally-occurring mutation rate. The constant presence of naturally caused mutations make such studies necessarily statistical, but the conclusion seems to be that no important increase in mutations occurs, any increase, if present, being lost in the much greater mass of "normal" mutations.

2. In experiments with mice, it was found that, to raise the level of radiation-induced mutations to a level much above that natural-occurrence rate, it was necessary to irradiate the sperm-producing cells with very high levels of hard rays. The radiation level required was so

high, in fact, that only the males could be radiated effectively, since the testes could be irradiated while the abdominal organs were shielded with lead. The required radiation was well into the lethal-dosage level if the whole body were irradiated.

3. In effect, matured sperm cells are *more* susceptible than the immature sperms. Mating irradiated mice immediately after exposure produced higher mutation levels, by far, than did a delayed mating. Apparently sperm cells which are damaged before maturity are destroyed, and have no chance of producing zygotes with altered heredity. The result observed is that there is a period of temporary sterility after irradiation, until new, whole sperms can be produced.

4. Measurements on the rate of mutations-per-radiation-unit show, moreover, that the observed rate of natural mutations can *not* be accounted for by cosmic rays, terrestrial radioactivity, et cetera. Naturally occurring hard radiations of these types fail to account for the number of observed natural mutations by a factor of 100! Evidently there is some vastly more powerful mutation-producing factor at work, a factor as yet unidentified.

5. Among Nature's little protective tricks is one which makes the germinal cells of long-lived species markedly more resistant to mutation than those of short-lived animals. The reproductive tissues of a fruit fly are exposed to mutating influences for a total period of a month

or so between birth and death; germinal tissues of a human being are exposed to all naturally occurring mutational influences for a period some four hundred times as long before child-bearing, very frequently. Yet the absolute rate of natural mutation in both the long-lived and short-lived species is apparently equal. After all, however, while a species survives only if its individual members have survival characteristics—it survives *as a species* only if the germ tissues which are its real existence have sufficient stability to survive unchanged, in the overwhelming majority of cases, despite all mutational pressures and circumstances. Remember that the biologist's answer to the old saw about which came first, the hen or the egg, is "The egg, of course; a hen is just an egg's way of making more eggs," expresses a basic truth. The *species* survives in the eggs—and don't worry about the hen. Naturally, high stability chromosomes and genes must be evolved before a long-individual-life species can continue existence as a species.

And—Item 6—no *new* mutations have been observed. All the radiation-induced mutations so far observed have been previously reported as naturally-occurring mutations of the species under investigation. This corresponds with the principle Dr. Winter expressed in his recent story "Expedition Mercy", concerning diseases of human beings on alien worlds. The symptoms of the alien-world diseases will

all be old, familiar symptoms, because the symptoms are the human body's reactions to the alien stimulus—and the gamut of human-body-reactions is already known. Similarly, natural mutational forces have found more or less the full gamut of chromosome reactions to hard-radiation bombardment, and other mutating influences. There are scores of known mutational resultants known in human beings already—the best known to the layman being hemophilia, "bleeders' disease", which isn't a disease at all.

However, you will remember that Dr. Winter's story ended up with the fictional medico's flat statement that, the human body reactions being limited, no one could develop, for instance, an aquamarine coloration. And the inevitable appearance of an aquamarine crewman. (The sequel explains how it's done, incidentally!) Similarly, while no hitherto unknown mutations have been observed—mutations are statistical. The chemical binding forces that hold together the atoms

which make up the incredibly complex protein molecules of a gene are chains having certain characteristic weakest links. Naturally, there are much greater chances that the gene will break at those weakest-link spots, producing characteristic mutations. But even a chain with a weak link #37 can be broken at link #52 if you hit #52 with a high-velocity rifle bullet. It's less probable that #52 will break—but by no means impossible. It's simply that you'll get thousands of mutations due to failure of link #37 for every one due to failure of link #52.

The proof of that statement? Aside from its logical necessity, the proof is easy. A camel and a llama are cousins—but far, far beyond the range of mutational variation within a single animal type. Evidently very occasional mutations occur producing marked, new variations. Evolution proceeds slowly, because such marked, unusual, and favorable changes occur rarely. But they do occur.

THE EDITOR.

Now we're looking for Don Evans and Gerald Clarke. Got a check waiting for them, too. And we don't know where they are.

SEETEE SHOCK

BY WILL STEWART

First of Three Parts. Trouble with "seetee"—contraterrene matter—was inevitable. But an engineer could handle that; it was trouble with men that meant death. And this is the story of a man already killed, yet fighting his murderers!

Illustrated by Orban

The void leered. Implacable hostility flattened itself against the frosty dark, waiting the time to strike. Shocking danger fled away from him into the sucking emptiness, and cunningly eluded him, and ruthlessly returned. Timeless peril watched forever, with the cruel, cold eyes of the stars.

Nicol Jenkins, spatial engineer, fought back silently.

The seetee bull was his weapon. He rode the ugly metal bulk of it, sealed in chafing dirigible armor, seated astride the pile chamber. He drove it, his lanky body crouched against insensate enmity, his gray eyes alert. He gripped the cold wheel, hands stiffly numb in his clumsy plastic gloves, and turned the heavy machine against the baleful disdain of unfeeling space.

"Back, little man—better go back!"

The only sound his ears could hear was the faint hiss of oxygen from

the regulator valve under his jaw, but his private hopes and terrors turned that thin susurrant into a warning voice, whispering unceasingly out of the airless, soundless spatial night.

"Back, human being," it jeered. "Your place is Earth. You weren't designed for space. You and your puny kind are too feeble to exist here, and far too foolish to use the deadly toys you're grasping for. No man can tread the contraterrene drift!"

Clumsy in the bulky armor, Jenkins tried impatiently to shake himself awake. He didn't want to listen to that murmur of his own thoughts in the jet, but he had been too long in space. It was too many weary months since he had seen the green land and glinting seas of Earth, or felt the wind of Earth on his face, or heard the voice of a woman.

Once there had been a girl. For a long time, fighting the spatial

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night, he had been able to banish the whispering menace of it by thinking of her. Once the memory of her had been a precious link to the human world for which he strived, but now it was hard to recall the color of her eyes or the way her honey-colored hair was done.

He tried to see her now —

Jane Hardin had been her name. He met her on the long voyage out

from Earth, over two years ago. They both were new to space. Together they had felt the first jarring shock of dark infinity, and its inhuman hostility had somehow joined them in a vital comradeship.

They had stood together on the observation deck, sharing the magnificence of man's challenge to the encompassing sphere of bitter night and cruel, far splendor around the

lonely atom of the liner. They had played shuffleboard and eaten their meals together, discovering with delight that they had both grown up in the same quiet suburb of Panama City. But then something happened.

Jenkins still didn't know what had gone wrong. The night before they reached Pallasport, he had asked to see her again. She seemed radiantly pleased, until he mentioned that he was going to work for Seetee, Inc., then she recoiled from him, white-faced, as if he had struck her.

She seemed inexplicably hurt at first, and then became coolly watchful and aloof. Hopefully, striving against that sudden, mistrustful reserve, he showed her his precious copy of his uncle's book. He told her eagerly of Martin Brand's splendid dream of unbounded power from seetee. Desperately, he begged her to tell him what was wrong.

Jane Hardin listened quietly, and told him nothing. She wouldn't give him any address, and he lost her when the liner docked. He hadn't seen her again—or any woman, in the two years since he came out to lonely Freedonia. Her bright image had dimmed in his thoughts, and all his wistfulness for her lost loveliness could no longer stop the hissing of his own apprehensions in the oxygen jet.

"You've been too long away from Earth," that faint whisper mocked him now. "Your petty kind belongs to that little world, and you are fools to grope for control of seetee.

You're too frail and small for space, and the drift will only kill you if you grasp it."

Jenkins tried not to listen. Crouching on the bull, he bent his head in the bubble of his helmet, watching the blank face of the radar-scope in the center of the control wheel. His lean brown jaw drew hard, his firm lips tightened. He couldn't stop the jet, or the haunting dreads that found voice in it—but he refused to talk to himself.

"You men weren't shaped for space," that thin hissing mocked him. "Your feeble senses and your fragile, watery bodies were designed for a kinder environment. Your invasion here is rashest folly, and you'll win no prize from the drift but death."

He compressed his lips, and bent grimly to the job of collecting contraterrene metal for the shop on the airless rock called Freedonia. He had volunteered to drive the bull because Martin Brand was his uncle and because he might have asked for a softer assignment. Now he had no intention of turning back.

A white pip glowed on the scope. He swung the bull to center it, leaning clumsily to uncover the testing gun. He waited, riding the machine toward the unseen meteor, until the secondary pip on the distance scale reached the ten-kilometer mark.

Now!

Tense in the confining armor, he

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jabbed a stiff-gloved finger at the firing key. The fragment of drift that showed in the scope was still too far for his eyes to see, but the search beam trained the gun upon it. Silently, in the soundless night, the slender paragravity solenoid fired the tiny testing pellet of terrene iron.

Waiting for the flash, Jenkins turned the bull aside. That was always hard to do. The collector bin in front of him was shielded with a solid foot of lead, and he wanted instinctively to place that metal between his body and the flash. But human instincts weren't fitted to space.

His engineering brain¹ was well aware of that. The terribly penetrating rays from the flash would go through his unprotected body as cleanly as a bullet through a pane of glass, almost without harm. Striking any common shielding, however, they would multiply into showers of softer, more lethal secondary rays.

He swung the machine, to expose his body. Waiting, counting seconds, he ducked his head and flung up his armored arm to shield his face. An utterly useless gesture—but he couldn't help it. Two long years of driving the bull and working in the shops on Freedonia had taught him too well that men weren't made to work the drift.

Fury!

The testing pellet from the little gun was only half a milligram of terrene iron. A tiny key to the blinding violence of the tee-seetee

reaction. If it struck a contraterrene target, it would cease to exist as matter. Orbital electrons would collide with orbital positrons. Positive terrene nuclei would strike negative contraterrene nuclei. Unlike charges would cancel, merging into monstrous energy.

"The drift will get you, engineer," the jet was snarling softly. "Perhaps you can shield your puny body against the emptiness and the cold. Perhaps you can manufacture oxygen and water and food. But all your feeble skill can't protect you from those radiations—from seetee shock!"

That was the voice of his own deep dread. For human bodies weren't designed to endure those deadly rays from the annihilation of clustered nuclei—and the deadlier secondaries they struck out of any common barrier. Men had known the effect of such radiations ever since Hiroshima.

And spacemen called it seetee shock.

Jenkins waited, crouching on the bull. He counted six seconds, and flinched from the flash of violet light that penetrated his closed eyelids. The analytic spectrograph attached to the gun clicked silently, and a shaded green lamp glowed softly on the recorder tape.

Awkward in the stiff fabric, Jenkins leaned down to read the analysis. Silicon, forty-four percent. Oxygen, aluminum, magnesium, and a trace of iron. A silicic rock, from the crust of the seetee Invader—

which collided with doomed Adonis to form the asteroids and the meteor drift long before the first man dreamed of voyaging space. Priceless fuel, if the power plant ever ran, it was useless now. He was after contraterrene iron and tungsten, that Lazarene wanted for the machines in the special shop. He shook his head and steered the heavy bull away, watching the scope for another fragment.

"Better give it up," the jet kept hissing. "You know you don't really need to do this, because now your uncle's rich. You ought to ask for leave, and make him give you a soft desk job in the Pallasport office, and have another look for Jane Hardin.

"Anyhow, you weren't evolved for space."

Perhaps he wasn't, but Jenkins was a spatial engineer. Son of another engineer, lost in the drift when Jenkins was three. Graduated with honors from the great institute of spatial engineering at Panama City, he was prepared to challenge the merciless hostility of space, with the pride of a fine tradition three centuries old.

Ziolkovsky and Oberth were among the early names—spatial engineers who never left the Earth. Goddard and Ley. Maxim-Gore was the one who looked into the vortices of the sun to discover paragravity—that selective, reversible, directable force, neither gravitation or electromagnetism, which replaced the rocket to lift men spaceward.

Later engineers, wresting the planets from the blind and mindless enmity of space, creating the wealth and might of Interplanet Corporation, also built a more enduring thing—a high code of selfless daring to serve the good of man. That tradition remained untarnished, for the hard abrasion of danger kept it bright. One of its heirs was old Jim Drake.

An old man now, great shoulders bent and roan hair, thinned, Drake had set out fifty years ago to subdue the brooding fury of the contraterrene drift. His first invention was the seetee marker.

Immense spidery wheels spinning in the unresisting vacuum, the Drake markers were placed in close orbits about the more massive fragments and more dangerous swarms of the seetee drift. Broad mirrors caught the unsetting sun, and filtered lenses and prisms winked out the unceasing warnings that had saved many a spaceman from seetee shock.

Jenkins twisted now in his cold seat on the bull, searching the nebula-dusted night. He found the vanishing red spark of the blinker set to mark the meteor swarm whose fringes he was exploring. Automatically, he counted seconds.

The orange point burned four seconds—warning that the mass of the marked swarm was of the order of ten to the fourth metric tons; ten thousand tons of slumbering, unutterable violence. The blue winked three seconds, saying that the mean

diameter of the swarm was above a thousand kilometers. The red flamed five seconds again, to tell him that the seetee cloud was estimated to contain a hundred thousand dangerous fragments.

"We're going to get you, little biped," the jet was taunting him, "because you're too soft and clumsy and slow to survive in space. You've ventured too far from the warm seas where your kind of life was born. You need too much protection, and you weren't evolved to work the drift."

Orienting himself by the blinker, he swung the bull back toward the outskirts of the swarm. He bent to search the scope for another hopeful fragment, trying not to listen to the restless chittering of his fears.

"We'll kill you, Jenkins," growled the jet. "We'll freeze you hard as iron, sometime when a heating unit fails. Or burn you to vapor when the pile you're sitting on happens to blow out. Or suck your body to a brittle mummy, if a leak ever breaks in your armor. Or, more likely, we'll get you with the drift!"

The jet made a hissing chuckle, as the valve closed and fluttered open.

"How do you want to die, little engineer?" it mocked him. "Do you want to light up the dark like a nova, when your terrene body reacts with a few kilograms of the Invader? Or do you prefer the slower death of seetee shock?"

Jenkins watched the blankness of the scope, and tried to guard himself

from such haunting terrors with the magnificent tradition of the spatial engineers. It was close to him. For his own famous uncle, Martin Brand, was no doubt the foremost of them all.

"Wait, young fool!" the jet kept jeering. "Suppose you engineers do unlock contraterrene power—how can you control it? How are you going to hold it for the benefit of man, against the whispering politicians and the cold-eyed financiers and the men of guts and blood?"

Jenkins shook himself uneasily, and clung to the thought of Martin Brand.

"Remember Hiroshima!" mocked the jet. "Remember Interplanet and the Spatial War. The engineers who first cracked the atom hoped to benefit mankind, just as you do. But the few who seized control of fission power soon managed to rule the rest. How can you stop history from repeating the same ugly story with the greater power of seetee?"

Martin Brand could find a way, Jenkins thought. For Brand was something more than a distinguished engineer. He had learned how to defeat the politicians in their smoke-filled caucus rooms, and trim the financiers on their own stock exchanges. Brand could accomplish anything.

Jenkins searched the empty scope, probing back into the outskirts of the swarm. He tried to ignore the thin sighing of the jet, but he couldn't stop the whispering of his own apprehensions. That dry sibu-

lation became the weary murmuring of the dead, unknown peoples of Adonis and the seetee Invader.

"Leave us alone, reckless stranger," that sad susurruration seemed to breathe. "Let us rest. These broken rocks are our cold tombs. Beware of what you find, rash engineer, if you dare disturb our bones."

Shivering in the cramping stiffness of his armor, Jenkins sucked a drink of bitter tea from the tube in his helmet, and grimly tried to shake himself awake.

"What are you seeking, little creature?" mocked the whispers. "The secret of our death—so that you can kill your own proud planets, with the fury of seetee?"

Not that, Jenkins told himself resolutely. New life was what the gaudy print of his uncle's prospectuses always promised the power-famished planets, not death.

"But look around you," warned those sad voices in his mind. "Look at the shattered fragments of the dead Invader and murdered Adonis, destroyed by the very force you seek!"

Jenkins shrugged uncomfortably, and crouched to watch the scope. Of course there was danger in the drift, but such men as Martin Brand would be great enough to meet it. Firmly, he set his mind upon the brilliant career of his distinguished uncle.

II.

The living tradition of the spatial engineers was built of mighty

dreams fashioned into hard reality by human brains and human daring, and Martin Brand was still the mightiest of the dreamers. Jenkins clung to the picture of his red, raw-boned, craggedly candid face, for a kind of talisman against the whisper of his secret terrors in the jet.

The brightest interludes of all his boyhood at Panama City had been the occasional visits of Martin Brand. For the famous engineer had provided generously for his widowed sister and her son, and now and then he came back to the modest suburban apartment he kept for them, to see Earth again and lay out his next audacious project.

Wonderful intervals those had been, in the humdrum of school. Brand brought thrilling gifts from other worlds—a trained mud-devil in a jar from Venus, a bottle of red sand from Mars, a rock from lost Adonis, a rainbow-colored shard from one of the broken Callistonian domes.

There were always wines and foods too rare for common days. There were trips to the beaches or the mountains or the Moon. There was always a girl, usually an exciting blond actress, fluttering with apparent rapture as she clung to the strong arm of the dashing engineer from space.

And Martin Brand talked.

The talk, to Jenkins, was always the best. A tall, gaunt, expansive man, wide of gesture and colorful of garb and magnificent of voice, Brand talked of the vast projects behind

him and the grander plans ahead. On the first visit Jenkins could recall, his topic had been a huge paragravity separation plant he was building to refine uranium from the seas of Venus.

"The Empire's starved for power metals, and I wish you could have seen those little yellow men hiss and blink when they saw my figures on the uranium halide content." Brand's wide shoulders lifted lightly, splendid in brocaded Venusian silk. "They nearly balked when they found the installation would cost nine billions, but I pointed out they weren't buying just a plant—but their economic freedom from Interplanet."

Next time Brand came to Earth, a few years later, Jenkins wanted to know how the plant was working. Genial amusement made pleasant crinkles around the great man's fine gray eyes.

"The little yellow men lost their faith in me"—proud and straight in splendid purple-and-gold lounging pajamas, Brand shrugged indulgently—"but I settled for half my fees, and now I'm working on a more promising project."

Smiling at the cold fire of an immense diamond on his lean hand, Brand lowered his rich voice confidentially.

"Don't tell a soul, Nicky. But I've got the Martian industrial trust interested in an atomic furnace to make synthetic terraforming diamonds."

"Diamonds!" Jenkins gasped with breathless admiration.

"An extremely ingenious process." Brand tossed the monstrous gem, and caught it gracefully. "The pressurized retorts must be heated above the fusion point of carbon, and cooled under the exact temperature control for five years."

That process must have been profitable to Martin Brand, for he was back on Earth again, in his sleek new sixty-meter yacht *Adonis*, a year before the retorts were to be opened. He wore bigger diamonds than ever, and he was already talking of his next undertaking.

"A paragravity caisson!" His deep voice held a hypnotic confidence. "To explore the surface of Jupiter. The Russians on the Jovian moons are desperate for uranium and thorium, and they'll back me to the limit."

Jenkins gaped with awe.

"Do you really mean to land on Jupiter?"

"Not in person." Brand chuckled easily. "I don't care for the feeling of ten thousand kilometers of methane and ammonia over my head—not even with a repulsion field to hold the pressure back. I'm a spatial engineer, not a suicide."

And it was just enough, Jenkins thought, for lesser men to take the chances. His uncle's engineering genius was too precious to be lost. "Fifth Freedom" was proof enough of that. For the project Brand had diagrammed in that thin blue book,

it always seemed to Jenkins, was still the most splendid dream of all those daring dreamers whose visions had conquered space.

Martin Brand still liked to tell the story of the book, over a drink and a good cigar, chuckling at his naive expectation of changing the faces of all the planets. Jenkins had heard it often, always awed at his uncle's casual greatness.

"Notion first hit me, out in the *Mandate*." Brand used to tilt his lean-cheeked head in a way that showed his distinguished profile, smiling with amusement at the open worship of Jenkins. "Just out of the institute, and green to space. But I met this asterite engineer, Jim Drake, and listened to his schemes to work the seetee drift."

Brand used to toss back his long dark hair, with a cool little smile of watchful daring.

"That's when the idea hit me, and I came back home to work it out." The ringing eloquence of his deep voice was always music, to the eager ears of Jenkins. "Lived in a gloomy hall bedroom. Finally spent all I could borrow, to persuade a publisher to put out two thousand copies of my little prospectus for a better world."

Brand used to chuckle with a wry amusement.

"Pretty optimistic then. Meant to head off the next Spatial War—and make an end of most other human misfortunes, besides. The innocent folly of youth! That little book proclaimed the Fifth Freedom—

boundless free power for every man on every planet."

Casually, Brand had once rewarded the breathless interest of Jenkins with an autographed copy of that first edition. The younger engineer still carried that precious volume in his space bag. He knew the words and the momentous symbols by heart—and he still shared that innocent folly.

"The hypothesis of contraterrene matter was first put forward by the pioneer atomic physicists of the twentieth century," Brand's epochal preface began. "That audacious speculation proved itself—even before men reached space—by solving the old mystery of the cosmic rays.

"For dust from the contraterrene drift, as well as a few larger fragments, sifts continually into Earth's atmosphere. The energetic protons from the tee-seetee reaction in the upper atmosphere were man's first clue to the boundless power awaiting conquest.

"The spatial drift of the asteroid belt, now politically administered as a mandate of the major planets, is estimated to be twelve percent seetee. That reservoir of energy is vast beyond imagination. Such spatial engineers as Drake have long envisioned that monstrous power chained and channeled to lift the ships and turn the wheels and expand the lives of men, and this small book will deal only with the technology of seetee power transmission.

"For contraterrene energy must

obviously be generated far at space—outside any trace of terrene atmosphere. The problem is transmission. Other engineers have dreamed of wireless power—and stumbled over the inverse-square law. For ordinary electromagnetic waves, spreading with the velocity of light, dissipate their energy to the limits of the universe.

"The author tried a new approach. Studying the paragravity fields of the sunspots, he found a departure from the inverse-square law. This book sets forth the mathematical theory of a special paragravity field—in effect, a standing wave of energy—vast enough to inclose the solar system.

"This power field can be maintained with a coefficient of loss—due entirely to the disturbing masses of the sun and the planets—amounting to less than one percent of the transmitted power. Simple tripolar receptors can draw any required flow of power from any point in the field, to operate a child's toy or a spatial liner.

"The writer hopes that a non-profit trust can be set up immediately, to build such a transmitter. It would cost less than the planets spend every day preparing for another war over the dwindling uranium reserves—and make that war necessary!

"The operation expense should be negligible, since seetee fuel is abundant and the equipment must be almost altogether automatic. In fact, the by-products of useful metals re-

fined from the terrene half of the fuel should cover operating costs, making the enormous power output genuinely free.

"And power must be free!"

So the youthful idealist had written, twenty years ago.

"What a sentimental fool I must have been!" Martin Brand told Jenkins. "All I knew was engineering. Interplanet, however, soon educated me in other fields."

"How was that?"

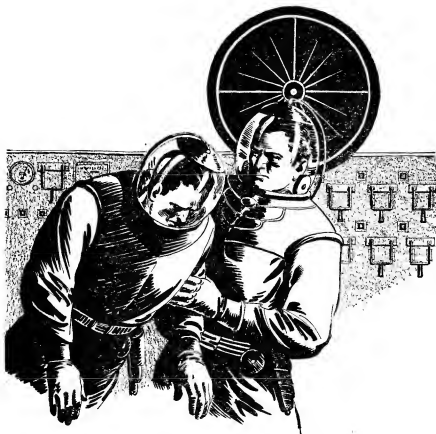
"Interplanet owns most of the known uranium and thorium reserves," Brand explained cheerfully. "The directors lost the Spatial War, but they won everything back with the political victory of the High Space Mandate. Those reserves are worth three hundred billion—and they mark up prices twice as fast as the supply goes down. They just couldn't afford to let a fresh young pup of a spatial engineer wreck that tight little monopoly!"

"So what happened?"

"They taught me a lesson." The great man shrugged his massive shoulders, smiling. "I haunted lobbies to buttonhole important men, and gave away free copies of the book, and talked on street corners until the cops roughed me up—because the big boys didn't like it."

Brand tossed back his flowing hair.

"But there wasn't any rush of humanitarians to build a free power plant. I learned the lesson at last,



and gave it up. I started looking for a job—and found that Interplanet was still teaching me.”

“Huh?”

“No job.” Brand smiled easily. “Interplanet had me on a blacklist. When I discovered that, I put my lesson into practice. Walking past the Venusian legation, I happened to see a poster offering rewards for a uranium strike outside the Mandate. I set down an interesting figure for

the uranium in their oceans, and sketched that separation plant on the back of an old envelope while I was waiting to talk to the ambassador.”

Brand chuckled genially.

“That was the real beginning—”

After Venus there was Mars. Brand left the Jovian Soviet just before the tests of his paragravity caisson. Arriving in the High Space Mandate, alert for another profitable project, he met old Jim Drake again.

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Bankrupt, the asterite engineer was free on bond in Pallasport, awaiting trial for violation of a Mandate law against unlicensed experiment with contraterrene matter. Brand listened to Drake's story, and found his new project.

No longer the innocent idealist who wrote "Fifth Freedom," Brand used his twenty years of schooling in politics and finance. He hired a legal expert to defeat the charges against Drake, and pulled the necessary wires to obtain a special research license.

He founded Seetee, Inc.

"Back the spatial engineers!" screamed the crimson print of his first prospectus. "Buy a slice of the Seetee Age! Help wake and tame the sleeping giant of contraterrene power—and let him lift your financial cares. Your Seetee shares are one-way tickets to easy street!"

The great man used his lesson. Surprisingly, all five of the Mandate commissioners voted unanimously to charter the corporation and approve that alluring prospectus. The branch manager of Interplanet bought the first block of Seetee stock issued to the public, and turned a tidy profit on it.

III.

When Jenkins first arrived from Earth, Martin Brand offered him a shiny private office in the advertising department of Seetee, Inc. Jenkins, however, eager to set his new skills against the hard hostility of space, insisted on a real engineering job.

Now, astride the seetee bull, he found another pip on the radarscope. He drove into testing range, and fired a terrene pellet. The flash showed contraterrene iron and tungsten, metal for Lazarene's special shop. Eagerly he moved in to pick it up.

Still the jet beneath his jaw was hissing, but it didn't bother now. Absorbed, he had no time to listen to the whisper of his fears. Even with the machine designed for it, collecting seetee wasn't quite simple or safe.

Slowing the heavy bull, he kept the pip centered in the scope until his eyes could find the jagged lump of deadly stuff ahead. He nosed toward it cautiously, watching the little geiger on his armored wrist.

The hot spot from the testing flash was not too hot. He didn't misjudge distance or velocity too badly. He kept the spinning seetee mass from collision with his body or any terrene part of the bull, and maneuvered it into the seetee bin ahead of the lead shield and the bedplates that joined the unlike parts of the machine. Triumphantly, he looked at the scales. Nearly two tons of mass—only eight more to go.

He glanced at the pale green glow of the instruments. Thirteen-two. Mandate time. He still had six hours. He got his bearings from the familiar stars, careful not to blind himself with the small hot disk of the sun, and swung the bull back toward the vanishing wink of the marker.

"Nick Jenkins!"

His lean frame stiffened in the bulky armor. The faint susurrations of the air jet hadn't changed, but suddenly it seemed to speak to him with the gentle drawl of Captain Rob McGee.

"Get me, Nick?" he thought McGee was whispering. "Then don't wait to load the bull. Come on back—ready for trouble!"

"Trouble?"

For one startled instant, Jenkins thought McGee had really spoken. A loyal friend and assistant of old Jim Drake, that squat little asterite ferried supplies to Freedonia from Pallasport and Obania. Jenkins first thought his rusty tug must be near, his voice coming on a photophone beam.

But the helmet amplifier, Jenkins recalled, was turned off—he had got tired of hearing the recorded drone of the Freedonia beacon. Grinning at himself, he leaned to watch the scope again. He started whistling in the helmet, tunelessly, to drown the hissing of the jet.

"Get me?" He thought he heard the urgent drawl of Rob McGee again, and his mind could see the square, plain-featured face of the odd little spaceman, the squinted eyes dark and frightened. "Come back, Nick!"

Jenkins blinked, and whistled louder. He had ridden the bull too far, perhaps, and worked too long beside the slumbering fury of the drift. Perhaps he ought to ask for

leave. He didn't like to take advantage of his kinship to Martin Brand, but seetee demanded sane men to work it.

"This is real, Nick," the jet insisted. "Listen to me."

Jenkins listened, uncomfortably. He had heard his fellow engineers say that Rob McGee was—different. The short little spaceman's parents had both survived a disaster in the drift, so the rumors went, their germ-plasm altered by the radiations. Their child, so the story went, was not quite human.

McGee, men whispered, was a mutant—nature's first groping effort, possibly, to shape a new human type to fit the new environment of space. Jenkins had come with him to Freedonia on the rusty *Good-by Jane*, and knew he had an uncanny grasp of time and distance and velocity.

"We need you, Nick!" The drawl in the jet seemed somehow heavy, choked, slow. "For something's wrong. I tried to get away to space, to call a warning to Mr. Brand, but now I'm blacking out."

"Huh?" Jenkins sat tense in the cramping stiffness of his armor, and he couldn't stop his gasping whisper. "What's wrong?"

"I don't quite know." The faint words seemed laborious, and very slow. "I can feel some things that other men can't—a Martian psychologist once told me that I've a different kind of *psi* capacity. But there are limits—"

Jenkins was listening desperately now, but that vocal quality seemed to vanish from the hissing of the jet, as if the brain of Rob McGee were slipping into darkness. For a time there was only the fluttering sigh of the regulator valve. Then, with no change in the sound, it seemed to speak again.

"... hard to see what hasn't happened." McGee seemed to gasp. "And I'm already blacking out. Can't reach you long. But I get the feel of danger—the feel of a seetee blast, that none of us can stop. The feel of treason . . . in a man . . . we trusted—"

The ebbing voice was gone.

"No!" Jenkins whispered hoarsely. "Which one of us would betray Freedonia?"

But the jet was merely sighing now, a tiny thread of sound spun through the silent infinity of space. The troubled face of little Rob McGee had vanished from his mind, and he saw two faint pips flash across the scope as he turned the bull. More metal—but the frantic urgency of that queer warning still gripped him.

Cold with alarm, his armored hands swung the bull toward where Freedonia should be. One dim atom, ten thousand kilometers away, the tiny asteroid was lost in the dust of stars. He snapped on the amplifier and swung the photophone mirror, searching for the beacon.

"Freedonia beam!" His search-

ing reflector caught the modulated beam, and the recorded signal made a hollow roaring in his helmet. "HSM T-89-AK-44."

Startled by that sudden blast of sound, Jenkins moved his hand to turn off the amplifier. For that harsh boom had drowned the quiet whisper of the jet, and it shattered his conviction that McGee had really called him. He was a spatial engineer, not a parapsychologist; he had always doubted the rumors of McGee's odd gifts.

"Time to ask for leave," he muttered wearily, before he remembered not to talk to himself. Old Jim Drake would understand, for other men had gone rock happy. Even Jean Lazarene, the brilliant, emotionless Earthman in charge of the special shop, had broken months ago and come back undisgraced.

"My turn next," he thought. "When the jets starts telling such tales as that!"

His hand was on the switch.

"HSM T-89-AK-44!" the signal roared reassuringly. "Freed—"

The signal stopped.

"Huh!" He caught his breath—for he hadn't turned the switch. Puzzled, he swung the mirror to search again. Nothing. He turned up the amplifier until the whisper of stray starlight became throbbing thunder in the helmet. Nothing, still.

"So the beacon's off?" he muttered huskily. "So there is trouble—and somebody has turned it off, to keep me from getting back to

help!" He swallowed at the sudden dry feeling in his throat. "Who is the traitor, Captain McGee?"

But the amplifier merely rumbled with the voiceless crash of starlight. He snapped it off impatiently. At first the dead silence of space seemed absolute, and then his straining ears caught the breathing of the jet.

"Captain McGee!" he gasped frantically. "Can you talk—?"

But the hissing jet had no more words.

Cold panic clutched his throat, for he needed that beacon. McGee, he knew, was oddly at home in space. The rumors said he had an extrasensory perception for time and mass and distance and motion. But Jenkins was no mutant, evolved for space. He had to rely on his awkward instruments and his feeble physical senses, and the frown of implacable infinity frightened and confused him now.

The diamond stars withdrew from him, remotely cold. The friendly constellations shattered into alien strangeness. The cruel blue eye of the diminished sun stared blindly from the wrong position. Dead ahead of the bull, where Freedonia should have been, another Drake blinker flashed its deadly warning.

No, the marker had to be the same. He counted seconds, desperately, as the colored points burned, to reassure himself. Four, three, and five. He fought his panic, and found the guiding pattern of the constellations. He put the sun back where it should be, and turned the

bull away from the deadly heart of the seetee swarm.

Freedonia was too far for the scope to show it, too faint for his eyes to pick it up. He thought it ought to be somewhere north, and he drove the bull that way, thrusting on the wheel to turn all the silent power of the pile into the paragravity drive units behind them. Searching the frozen glitter of the far star clouds, he envied the rumored extrasensory perceptions of little Rob McGee.

Earth-born, Jenkins was no mutant spaceman. His body and his senses were designed for a kindlier world, but he was still a spatial engineer. He tried to keep his head. He used his clumsy instruments, and made his feeble senses serve.

He drove the bull toward Polaris, searching Ursa Minor, hopefully watching the scope. Ghostly pips shone and vanished—for Freedonia was circled with a million deadly moonlets; Drake had manipulated its paragravity field to capture clouds of seetee meteors for a reserve of metal and fuel and a barrier to intruders.

When his rough dead reckoning told him Freedonia should be within a few thousand kilometers, he deliberately slowed the bull. No, panic screamed. Try that faint spark—or that! But those stars, sanity whispered, beckoning him to death.

He swung the bull in a wide slow circle, searching. He had to find

Freedonia, because he had no supplies or charts or instruments or even power enough for a long spatial voyage. He had to find it soon, because McGee's appeal had left him little time for blundering. At last he saw one pale point that crept across the rest, but that brought him small elation.

That moving speck might be Freedonia, a thousand kilometers away. More likely it was a lethal fragment of the drift, perilously near. His dull senses couldn't tell him, but he presently found it in the scope, with a secondary pip on the distance scale at eight hundred kilometers.

It had to be Freedonia: he could have hailed it, then, with his own photophone beam—if he had dared show a light. But he had no weapon. Not even a magazine of seetee pellets for the testing gun. Surprise would be his only advantage.

He pushed the bull to full acceleration for three hundred kilometers, then to full deceleration. At two hundred kilometers he occulted Polaris with the rock, to start picking his way through the triple shell of satellite mines that Drake had placed for an inner defense.

Freedonia was swelling at last, when he came inside the mines, to a jagged black cube of fractured iron, rolling slowly against the blacker void. The twin beacon lights on their spidery towers at the two poles were still extinct, and he saw no movement anywhere.

He found McGee's old tug, the

Good-by Jane, standing like an up-ended ingot of rusty steel on the narrow spaceport. It showed no signals. Nothing moved about the white-painted warehouses beyond it. He looked anxiously for the green light that always burned above the living-tunnel cut in a black iron cliff, but even that was dark. Panic took hold of him.

He didn't try to land on the field, for the bull was not designed for that. He lifted it to another dark face of the angular planetoid, and dropped it beside a slender steel tower that crowned a high iron point. Carefully, he nosed it down into an iron-lipped fissure. The slightest error, here, could graze terrene iron with the seetee ore bin, disastrously. The breath of Jenkins stopped, but he kept his lean hands steady on the wheel.

He slipped the bull at last into its fitted berth above the seetee ore chutes, and secured it with the paragravity anchor. He quenched the pile, and fumbled with numb fingers to unlock the clamps that held his armor to the seat. Stiffly, he clambered off the machine.

He tried to flex his weary body, and seized a heavy wrench from the tool box on the machine, the handiest weapon he could see. Clutching that in one clumsy glove, he reached with the other for the controls at his waist. He drove the dirigible armor down a dim corridor into the contra-terrene machine shop, in search of the unknown enemy.

IV.

The shop was a cavernous gallery, cut into the iron mass of Freedonia. A glare of cold light from high fixtures fell upon an endless row of massive dark machines. Before the machines was a tall barrier of steel mesh, hung with red-lettered luminous warning signs:

Keep Off! SEETEE!

Jenkins dropped his paragravity: driven armor to the walk outside the railing. He clutched his clumsy club, peering into the shadowy vastness beyond. He tried to listen, with an Earthman's reflex, and the eerie silence almost frightened him.

For the shop was running.

Beyond that dark barrier, an endless floor of untouchable contraterrene iron rested on a dim forest of wide-flanged bedplates. At the end of the shop, below the ore bins beneath the chute where he had berthed the seetee bull, untouchable ingots of sectee iron came glowing from a huge automatic induction furnace which was also untouchable.

Untouchable hammers shaped those ingots—striking in a dead silence that gave them a curious illusion of unreality. Untouchable lathes sliced off untouchable turnings. Untouchable machines finished untouchable machinings, and placed them upon a crawling assembly line.

The assembled devices, however,

which an automatic crane lifted from the end of the assembly line, were not wholly untouchable. They were new bedplates, shaped like immense inverted mushrooms.

Cased with terrene iron, the circular crowns could be anchored to terrene foundations. Interlocked within them were terrene plates and seetee counter-plates, unlike surfaces with invisible clearances held apart by surface fields of permanent negative paragravity. The upright seetee stalks, untouchable, could support more contraterrene machines.

Jenkins gasped with relief, to discover the shop still running normally. Nobody was in sight from where he stood, but these machines were designed to run with little attention. He tried to grin at his haunting unease.

"Just rock happy, like Lazarene was," he muttered wearily. "Probably nothing really wrong. Maybe that beacon just burned out, and everybody's too busy setting up the machines in Lazarene's special shop to notice the trouble. Guess I just imagined McGee's voice in the jet. S'pose I had better ask Drake for a few months off—"

His breath caught. He was watching the automatic crane carrying the newest bedplate from the assembly line to its cradle on a waiting rail car. The car, he saw, was already loaded with twelve new bedplates—with no room for another.

Breathless, he waited for somebody to start the tiny electric loco-

motive and spot another car. But nobody did. He waited, shivering, for the crane and the whole assembly line to stop—for the relays in the automatic control board were set to stop everything when a car was loaded, until the crew had placed another car and pressed a signal button.

But some relay must have stuck.

Nightmarish horror fell upon Jenkins, when he saw what was happening. The crane was lowering that last bedplate toward the loaded car. The terrene crown of it would touch the scottee stalk of the one beneath—and the first slight reaction, warping unlike plates into contact, would be a fuse to detonate all Freedonia.

For a long heartbeat he stood rooted, numbed with terror. Why didn't somebody see that cataclysm in the making, and pull the safety switch? Where was everybody, anyhow? Why didn't— He swallowed hard, and moved.

He snapped on his helmet telephone, tilting his head to turn the dim red monochromatic beam toward the control station high at the end of that long iron gallery, almost above that automatic crane and its lethal burden. Young Rick Drake, he knew, should be on duty now.

"Rick!" he shouted hoarsely. "Stop that crane!"

He could see the pink flicker of the modulated beam on the dark iron wall behind the high platform, but no light answered him. The crane didn't stop.

"Wake up, Rick!" he gasped. "What's wrong?"

But he wasn't waiting for Rick Drake's answer. His taut fingers gripped the studs to drive his dirigible suit down the long gallery and lift him to the railed platform. Drake's huge body was slumped against the long control board, held half upright by the stiffness of his armor—but Jenkins had no time for Drake.

For the crane was moving fast.

Jenkins snatched the red-lit emergency switch, yanked hard. And he was still alive. For a breathless, shuddering second, that was all he knew. Then he saw that the shop was stopping.

The silent hammers ceased their eerie rise and fall. The untouchable tools were still, and the assembly line ceased moving. The automatic crane halted with its lethal burden, suspending cataclysm.

Trembling with his own reaction, Jenkins turned anxiously to Rick Drake. That tall young engineer sagged lifelessly, supported only by the unyielding fabric. His red-haired head lolled inside the bubble of the helmet, skin pale, mouth yawning, sightless eyes dilated.

Jenkins touched him, and that toppled his heavy body off the little stool. Jenkins caught him, and laid him on the railed platform. He lifted Drake's helmet to touch his own, shouting hoarsely:

"Rick, what happened to you?"

The body sagged loosely, as if

still warm. He thought the white lips moved a little, thought he heard a sighing breath. But the lips didn't speak, or the blank eyes focus.

What had happened to Freedomia?

He laid the unconscious man back on the platform, and straightened to face that monstrous problem. Why was the beacon dark? Why the whole rock so apparently deserted? What had struck Rick Drake down?

Shivering, Jenkins glanced at the bedplate beneath him, hanging from that automatic crane. Was that near-disaster freakish accident—or deliberate sabotage?

A quick examination of the maze of cables and relays beneath the control panels showed no cut wires. Stepping off the platform into emptiness, he checked his fall with the thrust unit behind his shoulders, and drove silently down a dark connecting tunnel into the generator room.

That room was another vast cavern hidden beneath the iron crags, and the unfinished machine inside it was the urgent goal of all the effort on the rock. Jenkins landed the small ship of his armor on another railed platform, high beside the reaction chamber. He peered around that gloomy chasm with puzzled, frightened eyes.

The reaction chamber beneath him was made in two huge hemispheres, held together and apart by scores of disk-shaped bedplates. The lower half was terrene steel, cadmium-shielded. Steel railings guarded the bright, harmless-seeming metal of

the upper dome, and red signs warned that it was untouchable see-tee. Other barriers, higher, surrounded the untouchable milling machines and separators and conveyors and metering injectors.

For one instant, as Jenkins came to rest on the control station, his mind could see the generator finished and running. Those bright machines were operating silently, and the injection fields forced a measured stream of refined contraterrene dust into the reaction chamber.

Touchable terrene machines, clustered around the terrene section of the chamber beneath him, were grinding and refining the terrene fuel. A terrene injector jetted terrene dust to meet the see-tee jet and cancel its unlike atoms into intolerable radiation.

Pure fury!

That reaction would be more savagely hot than the sun's atomic fire. No possible material could contain it, but the spatial engineers had forged a chain to bind its ultimate energy. Levin, a century ago, had first attempted to replace the heavy shielding of a ship's power pile with a paragravity field intense enough to bend the escaping rays and particles into harmless circles. Levin died of radiation burns when his pile blew up, but Dahlberg, twenty years later, found a way to dispose safely of the accumulating energy. He oscillated the special field inside a coil, inducing a secondary magnetic field which converted the savage violence of de-

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caying mesons and trapped photons into useful electricity.

The Levin-Dahlberg field thus had finally subdued the sullen power of atomic fission. It made possible such compact and almost safe atomic power piles as drove the seetee bull. And it could contain and transform the vaster might of seetec.

For a moment Jenkins saw the shining coils of gray-white condulloy already installed inside that vast reaction chamber—the coils had to be made of that precious superconductor, because the river of induced energy from that conversion field would vaporize any common metal.

His mind could see the serpentine gleam of the condulloy cables that would carry that monstrous current to the Brand transmitter already half installed above, in the thin steel tower already built on the highest crag of Freedonia. His engineer's bold imagination, for that moment, could picture that boundless torrent of energy flowing, building up the power-field that would serve all the needs of all the men who wished to tap it anywhere.

But the moment passed.

The generator and the Brand transmitter were not complete. Eighty tons of condulloy were needed, and that new alloy of rare isotopes was worth two dollars a gram. The cost evidently puzzled the financial genius of Martin Brand himself, for Jenkins knew that old Jim Drake had asked for the metal two months ago.

SEETEE SHOCK

The moment passed, and Jenkins searched the shadowy cavern before him for any signs of trouble. The railed machines were still. He saw no armor moving, and saw no hint of any sabotage. But Paul Anders, he knew, should be at work here.

He found the studs again, to lift his bulky suit from that high platform and drop it to the terrene iron of the floor. He found Anders there, lying beneath the terrene cup of the reaction chamber. A roll of blueprints lay near his armored hand, the wiring diagram of the Levin-Dahlberg coils.

Jenkins moved the lean Earthman to where the light was better. The long body was as pallidly lifeless as Rick Drake's had been, the head rolling limply in the helmet, the distended eyes unseeing.

What had struck these two men down?

A glance showed Jenkins that the armor was still intact, as Drake's had been. Air pressure and humidity and temperature were normal, oxygen and carbon dioxide and helium readings correct. No blood was visible, or any other sign of sudden violence.

Was it radiation illness?

Starting to a bleak recollection of McGee's telepathic warning of a seetee blast—if that queer experience had really been telepathy—Jenkins bent stiffly to study the tiny geiger on the limp man's wrist.

The face of it flashed green once, and again, as he peered at it, showing occasional penetrating particles

or photons too infrequent to be deadly. The counter needle, measuring the total accumulated exposure, was still on the white section of the scale—far from the orange that meant caution, the red that was danger, and the black that spelled death.

No, this wasn't seetee shock.

Some epidemic, perhaps?

Jenkins had taken four semesters of spatial medicine, but he could think of no disease which this might be. The living quarters, although somewhat cramped, were antiseptically sanitary. The two men must have been feeling fit when they came to work. They must have been stricken with inexplicable quickness—or else Rick Drake would have stopped the seetee shop.

Poison?

When all the planets were almost at war over the vanishing reserves of uranium and thorium, the contraterrene technology might seem an imperial prize. Jenkins could imagine desperate men—agents from Venus or Mars or the Jovian Soviet or even Interplanet—ready enough to murder twenty men for control of Freedonia.

He bent again to lift the stiff-clad arm of Anders, to peer again into the transparent helmet. There was no hint of *rigor mortis*. He could feel no pulse through the heavy sleeve, but the flesh seemed warm and elastic. He saw a slow breath-movement.

The man was still alive—but he wouldn't be, if that automatic crane had finished its last trip. Shivering,

Jenkins searched the shadows beneath the bulging reaction chamber. Shapeless danger peered out of the clots of darkness there, retreating as he strode forward. He followed leering peril around that dim, vast room, and upward again, beyond those railed untouchable machines.

The dirigible suit lifted him up out of the generator room, through one of the wide, insulated conduits where a condulloy cable was to run. He found nothing moving about the naked steel girders of the transmitter tower on the summit above, and no other victim.

Anxiously, he started toward the tunnel dwelling.

"Wait!" whispered terror, with the air jet's voice. "Try Lazarene's special shop—that's where the danger is!"

His taut body felt clammy in the armor. Sweat of fear was cold on his face, as he soared northward from the tower to another fractured face of Freedonia. For he had never liked the sallow-faced, metal-voiced engineer from Earth who called himself Jean Lazarene, and he had been appalled when old Jim Drake told him the actual purpose of the special shop.

"Seetee weapons!" he had gasped. "What's the need of them?"

"Freedonia has become a valuable prize." Drake's deep voice was a solemn rumble, and his faded eyes were grave. "Your uncle says there are men who would seize our plant and misuse it for military purposes. He feels that our efforts at secrecy

aren't enough, and he wants us to develop a missile for defense—a light, self-guided missile with a see-tee war head.”

“But don't we have the protection of the Mandate government?” Jenkins ventured a respectful protest. “Besides those clouds of drift—and the spatial mines!”

Old Drake nodded his roan head, wearily.

“But your uncle says that isn't enough. He's afraid of spies. He says the Mandate is a very feeble device, that any planet could upset. He insists that we develop a missile, and he asked me to put you in charge of the project.”

“Huh!” Jenkins caught his breath, and shook his head decisively. “No,” he said, “I'm more interested in the useful phases of



seetee. I don't like the idea of seetee weapons, and I'd rather run the bull. I wish you'd find another man."

"I don't want any seetee war," Drake's troubled voice assured him. "We'll develop nothing larger than we need to defend Freedomia." The old engineer shook his head. "Your uncle will be disappointed."

But Jenkins still wanted nothing to do with seetee missiles, and he kept his job on the bull. It was the lean Earthman, Lazarene, just back from leave, who was finally put in charge of the special shop.

Now, at the bottom of the jagged chasm that concealed the entrance to that arsenal, Jenkins dropped into darkness. Reluctant to betray himself with the helmet light, he groped his way into the iron-walled gallery—and stumbled over something stiffly yielding.

He staggered back, shaken. His groping glove found the light switch inside the entrance. He snapped on the lights, stooping apprehensively. His peering eyes swept the whole long shop, and saw no hostile movement. Swallowing hard, he looked down at what his booted feet had struck.

Three men, armored in white.

Jenkins bent awkwardly, to see the pale heads lolling in their helmets. The stout man was Feinberg, the blond man Hanson, the short man Ching. They were all engineers who had been assigned to Lazarene's crew. Their limp bodies lay in a

neat row against the iron wall, as if dragged there.

Jenkins lifted his armor to soar on past them. Shivering, he searched that long iron gallery again. Here were more railed, untouchable machines, all still. He lifted himself to the elevated control station, looking for Lazarene. The railed platform was empty.

Still bewildered, he saw no answer to the silent riddle of the rock—until he turned his flying armor back toward the doorway, and saw the empty spaces where machines had stood and the empty racks, against the dark iron walls, where the finished missiles had been stored.

Empty racks!

The meaning of that caught the back of his neck, and shook him with a breathless weakness. He dropped to look for other clues, and found the discarded loading hooks that men in powered armor had used to lift the crated missiles. He found wide-spaced parallel scratches, where the flanges of a paragravity conveyor tube had scraped the floor. Finally, in the dark bottom of the iron chasm outside he found a heavy missile, still in its battered aluminum launching tube, where hurried men had dropped it and left it.

Jenkins straightened over that long bright case, staring blankly at the patch of stars visible above the dark iron rim. The stars of splendid Orion—but he saw only unthinkable disaster.

"They can't"—he gasped unbe-

lievingly—"rob the arsenal . . . whoever they are—"

"But they've done it," his staggered awareness whispered in the air jet. "Very neatly, too. They must have brought a ship here, through the mines and the drift—with some traitor to show them the way. They knocked out the loyal men—somehow. Turned off the beacon, loaded their loot, and got away!"

"But they mustn't—" Jenkins muttered.

He stiffened abruptly. Perhaps he could stop them! For he had seen the beacon go off, not three hours ago—and they must have been an hour or longer loading those missiles and machines, even with modern paragravity conveyors. They couldn't get away fast, through the mines and the drift. Still they might be near.

"At least," he whispered, "I can try!"

He hurtled out of that narrow pit, soaring around Freedonia to the berth where he had left the seetee bull. That clumsy machine wasn't designed for a weapon, but it might do. The scope might find the escaping raiders, if they were near enough. The low-powered drive might overtake them, if they were slow enough. The tons of seetee metal in the bedplates and ore bin made a war head big enough to smash any ship—almost, to crack a planet.

Jenkins wasn't anxious to die as a suicide pilot. Perhaps he could

aim the bull like a missile, and then slip off in his armor. But that unknown raider mustn't get away. Its cargo was the end of the Mandate, the beginning of a new Spatial War, and ruin and oppression and death for all the planets but one.

If his life should be the price—

That unpleasant question didn't need decision yet, Jenkins told himself hopefully. First he had to find that departing craft, and then overtake it. He dropped past the unfinished transmitter tower, into the dim gallery where the seetee bull was berthed.

The quenched pile warmed while he clamped his armor to the cold metal seat. He gripped the wheel, watching the instruments, waiting for the wavering needles to steady. He tried to quiet his nerves, for the delicate task of backing out the bull. He caught his breath, and reached to release the anchor—

*Freedonia shuddered.

No sound struck him, for there was no air. But the iron rock shivered, and the heavy machine trembled under him. A terrible light flashed against the iron lip of the fissure above him, so bright that it wiped away all color.

Jenkins was blinded for an instant. The trembling of the asteroid ceased, and there was still no sound. In a moment he could see color—and the color he saw was the dreadful color of death. He saw all around him a pale, vanishing glow of blue.

He knew the meaning of that, even before he looked at his geiger.

The alarm of that tiny instrument was purring urgently against his wrist. The face of it was flickering with warning scarlet. He raised his wrist stiffly, to see the counter needle. It crept out of the red sector on the dial, even as he looked.

It crawled into the black.

"You've had it, Nick Jenkins," sighed the air jet beneath his jaw. "You don't have to go out looking for any chances to barter off your life. Because those raiders got you—whatever they are. Because you're going to die, Jenkins—of seetee shock!"

V.

He was going to die. Jenkins sat stiffly on the hard seat of the bull, staring at that fact without belief or understanding. It couldn't really be, he tried to tell himself. The flickering geiger must be lying, for he still felt quite well.

"Don't try to kid yourself, Nick Jenkins," the air jet whispered, with his own stunned awareness. "You know too much spatial medicine for that. These geigers are accurate—and that much hard radiation kills you as dead as a bullet through the head.

"It only takes longer to die."

He shook his head blankly in the helmet, too dazed to realize anything. The geiger stopped vibrating abruptly, as the tiny alarm spring ran down. Mechanically he wound it again with his stiff gloves, and set the needle back to zero.

"That won't help you, Jenkins," jeered the jet. "You can't turn back the radiation sickness in you. The men escaping in that ship have already murdered you—and Freedonia!"

The harsh impact of that loosed furious purpose in the blank void of his despair. He stiffened his shoulders and crouched to check the instruments and reached again to release the anchor. For he wasn't dead yet.

He slipped the bulky machine out of its berth. He backed it carefully out of the iron-walled fissure. The seetee bin didn't touch anything terrene, but the reset geiger on his wrist began to purr again as the bull rose into the open. In a moment he saw the cause, and shivered again.

He saw a vast new crater bitten into iron Freedonia, where the seetee shot had struck. The ragged metal ridges and summits around it, riven and twisted from the monstrous fury of the blast, still glowed evilly red. The flattened floor blazed with a white incandescence.

And the counter needle, already climbing into the orange sector on the face of the geiger, warned Jenkins that a silent storm of secondary radiations was raging about him. The incalculable energy of that primary blast had formed countless tons of radioactive isotopes in the rock. All Freedonia was poisoned, deadly now.

Instinctively he pushed hard on the wheel, to drive the bull away

from that ugly glow of that cancer in the rock.

"What's your hurry, Jenkins?" mocked the whisper of the jet. "A few more rays can't kill you any deader."

He grinned feebly at himself, and tried to swallow the bitter dryness in his throat. Looking back to study that glowing pit again, he decided the seetee shot must have come from the south. He swung the bull toward faint Octans, and bent to watch the scope.

A white pip showed!

An object at four hundred kilometers. It must be the raider—already beyond the triple shell of spatial mines. He centered it in the scope, and thrust the bull to full acceleration. Still the pip on the distance scale crawled farther out.

Five hundred kilometers, and six.

Octans, Jenkins knew, marked the safest passage through the drift beyond the mines. The pilot of the raider was clearly certain of his way. Who could he be?"

Jenkins pondered that, bitterly. One of his twenty-odd fellow engineers had obviously betrayed the great dream of Brand and Drake—but which could be guilty? What manner of man could pretend to share the perilous struggle to tame seetee, and turn traitor to his comrades and their goal?

He couldn't quite imagine.

The distance pip reached eight hundred kilometers. He knew the

chase was hopeless, yet he kept on until the nausea hit him—the first warning effect of that terrible energy which had burned through his body.

Gray illness fell upon him. His body tensed and shuddered. An icy sweat dissolved his strength, and turned his sick body clammy in the armor. The bull seemed to rock and pitch and drop beneath him, until he was utterly lost in the world.

The nausea ebbed at last. His knotted stomach relaxed. He tried to swallow the choking constriction in his throat, and straightened his quivering body weakly. He searched the constellations and found himself again—but the faint spark of the fleeing ship in Octans had vanished from the scope.

Laboriously, he swung the bull back toward the poisoned planetoid. A black depression followed him. The fact of his own sure death was still remote, half unreal. The thing that shocked and sickened him, with a sense of loss more painful than any personal blow, was the murder of the dream that he had helped to build.

For the Brand transmitter was to have been a wondrous new heart for human civilization, pumping out the energy that was ultimately life. All the planets were sick for power; most human ills, he thought, were merely symptoms of that sickness. Contraterrene energy could have cured them.

The new crater glared at him, as he came back to land. The heat of it was cooling swiftly. The cragged

rim was already black. Only the pit still glowed, a solitary eye of brooding, scarlet hate.

The alarm of his geiger purred again, for those new isotopes in the rock still glowed with more deadly rays than heat, and they would for months and years. All Freedonia was forbidden, now, radiant with energies too powerful for human bodies to endure.

His fellow engineers, Jenkins knew, must have died with their dream. For the seetee shot had been accurately placed in the center of a rough triangle, between the unfinished generator and the living quarters and the special shop. Nobody, he thought, could have escaped the penetrating radiations.

Yet he tried to hope.

He berthed and anchored the seetee bull again, and unclamped his armor from the seat. The nausea was gone. He felt almost well again, almost hopeful, as the massive suit lifted him over the sinister glow of that new crater and dropped him outside the living tunnel.

The outer valve of the entrance lock yawned open. Old Jim Drake stood just inside the chamber, leaning on the long solenoid of a portable prospecting gun. The set of his helmet and his uplifted arms showed such a frantic purpose that Jenkins called:

"Mr. Drake! What hap—"

Then he saw that Drake's thin-haired head had dropped limply forward in the helmet. Only the stiff fabric of his armor and the acci-

dental support of the testing gun held him upright. His seamed skin was very pale, and his huge frame toppled slowly when Jenkins caught his arm.

Drake was still alive. Laying his heavy body down outside the little chamber, Jenkins could feel the flexibility of life. But the counter needle of the geiger on his wrist had moved out of the white and the orange and the red, into the fatal black.

Certain death was planted in him.

Jenkins straightened, gulping at a tight ache in his throat. He picked up the testing gun to glance at the red-glowing magazine, marked boldly: SEETEE—OPEN IN VACUUM ONLY! The ten milligram pellets, intended for long-range prospecting in the terrene drift, made it also a formidable weapon.

He thought he could read a tragic story in the presence of the gun and the faint hint of stunned alarm and frantic purpose lingering on Drake's lax, bloodless face. He thought the aged engineer must have discovered the raid and started out to attack the looters, only to be abruptly stricken here.

Jenkins shook his head sadly. Except perhaps for Martin Brand, Drake had been the greatest name in spatial engineering. The first to attempt the taming of the seetee, he had been the real creator of Freedonia. If the dream must die, Jenkins thought soberly, perhaps it was fitting that Drake should perish too.

Wearry hands numb in the armor, Jenkins closed the outer valve. He spun a wheel to let air scream into the lock, anxiously watching the gauges. Pressure and temperature and oxygen were normal. He started unthinkingly to take off his helmet—and checked himself sharply.

Still sealed in the chafing fabric, he opened the inner valve and stalked heavily into the iron-walled dwelling. The lights still burned. A blare of mechanical music came faintly from the recreation room. Thin blue smoke was drifting out of the kitchen tunnel. He found six men in the main corridor.

They weren't moving.

Clad only in shorts and pajamas, they lay sprawled in a group on the floor, near the main air duct. He stooped clumsily over them, wondering what had brought them together here, and so found the slender cylinder of stainless steel that still lay in the lax fingers of a man beneath the opened grille.

Gasping, he picked up the cylinder.

WARNING! AMETINE BOMB

Contents: 200 grams ametine hydrate in odorless volatile vehicle, for use only as last resort in disaster. Keep in plainly marked emergency locker, accessible only to responsible personnel.

Use: Open spray for four seconds per one thousand cubic feet of space. Concentration so obtained will produce unconsciousness without discomfort within

one hour, and reduce oxygen metabolism eighty percent during period of coma.

Caution: Excessive inhalation will result in prolonged coma, with a possibility of grave organic complications. Persons rescued or discovered under ametine coma require immediate medical aid.

Jenkins tossed the empty bomb aside, nodding to himself. His eyes went back to the open air duct and the huddled, half-clad men beneath it. Still he didn't know the traitor's name, but the rest of the terrifying story seemed plain enough.

The bomb, of the standard type designed to save lives and agony in spatial disasters, had come from the emergency locker, just inside the valve. Some trusted man had simply opened the jet and placed it in the air duct, where the ventilators would blow its odorless spray through the whole tunnel—probably just a few minutes before time for the watches to change.

That was it, he decided grimly. The men going on duty had already breathed enough of the vapor to fall unconscious at their work—that had been the fate of Rick Drake and Anders and the rest. And the men coming in had all inhaled too much before they discovered the bomb. The elder Drake must have snatched his prospecting gun and started out after the bomb was found, too late.

But who was the traitor?

Which one of his fellow engineers would have sold the dream and promise of Freedonia to the agents of a jealous planet? Who would have supplied charts of the drift and

the mines to the unknown enemy? Which of those familiar men had been cool and false enough to place that ametine bomb and then signal the waiting raider—by darkening the beacon, no doubt!

Which seeming friend—

Still sealed in his armor, Jenkins moved stiffly to turn the heads of those lax men sprawled in the passage, marking them off a mental list. He stalked into the recreation room, where three men had fallen over cards on a table. He found the cook lying on the kitchen floor, and two men huddled beside their tables in the drafting room.

The whole staff numbered less than two dozen men, for machines had supplanted man power on Freedomia. Few men cared to work the drift, and fewer still had earned the watchful trust of Brand and Drake. Jenkins knew them all, and his search of the tunnel accounted for all but four.

He strode wearily back to the entrance lock, and waited for the roaring pumps to exhaust the air around his armor. Outside again, under the black sky and the small hot sun, he found two more men at the spaceport, collapsed beside a little electric truck on the dock, near the valves of the rusty *Good-by Jane*.

Aboard the sturdy tug, he found Captain Rob McGee in the pilot-house, sprawled on the deck. He was breathing quietly and slowly in the coma of ametine, but his square, homely face still held a look

of frantic urgency—the same desperate expression the mind of Jenkins had seemed to see, when he thought McGee was calling him.

McGee made three, and the one name left on the list was Jean Lazarene. Jenkins shook his head, uncertainly. He had never really liked the coldly efficient Earthman, but he couldn't understand how any man so capable could betray the tradition of the spatial engineers.

Yet it must be Lazarene. The evidence was clear. Even that mental breakdown must have been a ruse, to enable him to meet his confederates—

"But the name doesn't answer the riddle," his bitter thoughts whispered in the jet. "The real puzzle is the identity of the power behind the traitor. Whose agents corrupted Lazarene? Which planet sent that ship, and gave those tools and missiles and Lazarene's know-how?"

The answer to that, Jenkins thought grimly, would be revealed by the outcome of the next Spatial War.

Stooping clumsily in his armor, Jenkins caught McGee's wrist and turned it so that he could see the geiger of the unconscious man. The needle was in the black. He stared at it, trembling, his weary body sweating and clammy in the armor.

Pity throbbed in him, and savage anger shook him. He caught his breath, and a ruthless purpose stiffened his cramped body. He was dying, and all these men—but their dream must live!

VI.

Jenkins carried the stricken men out to Obania.

That little terraformed planetoid, outside the mines and the drift, had been the base of supplies for Freedomia. Jenkins had worked three months at the Seetee branch there, before old Jim Drake decided to trust him with the secrets of the guarded laboratory. He had learned to love that tiny, historic rock and its sturdy people.

Once Obania had been a thriving pioneer center. Once old Bruce O'Banion, who long ago had staked his uranium claims on the rock and hired Jim Drake to terraform it—once O'Banion had been a wealthy and influential leader of the hardy native asterites.

Once, for a few momentous days at the close of the Spatial War, Obania had been provisional capital of the hopeful new democracy of the far-flung planetoids, the High Space Union. The asterites had poured out blood and treasure to help break the old oppression of Interplanet, but the Treaty of Space sold their dreams of greatness and throttled their hopes of freedom.

The Mandate, set up to share the mineral wealth of the asteroids among the major planets, prohibited the private mining of uranium and harshly suppressed the Free Space Party. The betrayed people of the rocks endured a generation of stagnation and decay.

Now, however, Seetee had

brought Obania a feeble glow of prosperity. After twenty years of bitter idleness, old Bruce O'Banion was busy again, employed as manager of the new warehouse. A new machine shop was building and repairing terrene tools for the plant on Freedomia, and the dead street of the rusty little town lived again, with overalled workers and the waiting families of the engineers.

More than prosperity, the new corporation had brought back hope. Jenkins had seen it in the rekindled eyes of old O'Banion, and heard it in the bright voices of children playing in the street. The boundless tide of power from Freedomia could sweep away the suffocating rule of the Mandate, and bring the freedom the allied planets had promised and then denied.

So the mighty dream of Drake and Brand had run—but that brave hope seemed dim and distant now. The people of the rocks were still under the arbitrary law of the Mandate, and Jenkins could feel the cold shadow of seetee war upon them.

An hour out, Jenkins called the Obania base of the High Space Guard, the military force of the Mandate.

"Tug *Good-by Jane* requests permission for emergency landing. Craft contaminated with radiation. Carrying twenty-one men under ametine coma, all exposed to radiation."

"Don't approach public spaceport." That prompt reply was sharp-voiced with concern. "We

are calling the Worringer Radiation Clinic to stand by and show you a beacon. You are cleared to land in the safety well at the clinic."

Disasters with seetee were not unexpected. Martin Brand had picked Dr. Worringer as the finest radiation specialist in the Mandate, and built the modern clinic here as a new outpost of spatial medicine against the cruel ravages of hard radiations.

Landing, Jenkins almost dared to hope.

His body was stiff from four taut hours at the periscope, but that first nausea was gone. A sense of tired well-being possessed him. Perhaps, he tried to think, his little geiger had been out of adjustment. Or perhaps the thick lead shield behind the ore bin of the bull had protected his body, leaving only his arm and the instrument exposed.

He couldn't believe that he was going to die.

The clinic was a long white building, trimly new, isolated in a narrow, iron-walled cleft beyond the sagging, rust-reddened buildings over one of the depleted and abandoned uranium mines. The safety well beyond it was a lead-walled pit—for most of Worringer's patients were expected to arrive in contaminated craft, as deadly as the *Good-by Jane*.

The red flicker of the clinic photophone guided Jenkins to the pit. An excited attendant was asking the names of the victims.

"I'll identify them," Jenkins promised, "but don't call any of the

relatives, just yet. I'll break the bad news myself—but I want Dr. Worringer's verdict, first."

Still he was trying to hope.

He set the tug down gingerly in the narrow well, not so skillfully as little Rob McGee could have done. Limp with a weary relief, he opened the valves. Hurried attendants in white came aboard, listening anxiously to the warning bells of their own wrist geigers, to carry off the unconscious men that Jenkins had toiled to load into the tiny cabins and the narrow holds.

A tall, black-bearded man with brooding, angry eyes, Dr. Worringer was waiting in the white-walled emergency ward. His moodiness, Jenkins supposed, came from the bitterness of his own defeats in his long private war to make men immune to radiation sickness.

"So they were trying to work seetee?" Worringer scowled at the long row of still, sheet-covered forms on the white beds. "Till they ran their ship into a whiff of seetee dust, eh? And then some panicky fool had to open an ametine bomb?"

Jenkins nodded slowly, saying nothing of Lazarene and the unidentified raiders and the seetee shot. The first rumor of the truth, he thought, could end the uncertain truce of the Mandate. He was no expert at dissimulation, but he wanted to protect his uncle and the corporation.

He identified the unconscious men for the nurse making out their charts, and then stood watching

Worringer prod them impatiently and listen, frowning, at his stethoscope and peer gloomily into their dilated eyes with a bright-mirrored ophthalmoscope. Quiet nurses were scrubbing them for tissue tests, drawing blood specimens, setting up equipment for intravenous injections. Jenkins approached the bearded man to whisper huskily:

"Will they live?"

"The lab reports will tell." Worringer glared at him abruptly. "How much were you exposed?"

"Geiger needle in the black." Jenkins licked his lips and added hopefully: "But maybe it was wrong. I was nauseated at first, but now I feel pretty well."

"Means nothing," rapped the bearded man. "All fifth-degree cases feel pretty well—till decay sets in. Strip, and let's have a look."

Jenkins had no time for radiation sickness. Not even time to die. For the traitor Lazarene and the unknown power behind him were already preparing to spread the deadly venom of seetee war through the Mandate and the planets, and he thought the unfinished Brand transmitter on poisoned Freedonia held the only hope of stopping them.

He stood a moment, merely staring at the bloodless men lying still on the beds. He hoped Worringer could send them back in time to complete the generator and start the transmitter—if they could find eighty tons of costly condulloy.

If Worringer failed—

"Strip!" the bearded specialist snapped impatiently. "And let's see your throat."

Obediently, he took off his clothing and lay shivering a little under a thin sheet on a narrow hard bed. He let Worringer thump him and listen at his chest and study his throat and dazzle his eyes with a cruel little light.

One nurse drew a syringe-full of his dark blood. Another sponged his chest with cold antiseptic and swabbed on test smears of a pale liquid that slowly changed color on his skin. He sat up when they left him, calling anxiously to Worringer:

"Well, doctor?"

"Lie down!" the tall specialist barked at him. "You'll have to wait for the lab reports—but the smears already show that you've had enough. I'll order you an I. V. That sometimes makes the difference—but don't expect too much."

Jenkins lay back again, unwillingly. He felt the sting of the needle in his arm, and lay for an hour watching the slow drip of the pale yellow fluid running into his blood. It made him feel cold and faintly nauseated. He was glad when a nurse took the needle out and told him he could dress again.

He put on his clothes and wandered aimlessly about the beds of the two gigantic Drakes and tall Anders and little Rob McGee and the other men lying in the deathly pallor of ametime, dreading what he would have to tell the young wives

of Rick Drake and Anders, and the friends of old Jim Drake and McGee.

An aching loneliness possessed him. A bleak wistfulness brought him the laughing image of Jane Hlardin, the blond girl he had met on the liner from Earth. If nothing had happened to shatter their first warm companionship, he thought bitterly, Jane might have been on Obania to meet him.

He wondered what had chilled her toward him—and shook his head grimly. If Worringer's verdict was going to be death, it was too late to dream of her. If it was to be life, he would have no time for anything but the unfinished transmitter.

Waiting to see Worringer again, he sat down heavily. He felt vaguely ill from the intravenous injection, and exhaustion was like a toxin in him. He tried to plan what he must do while Worringer was waking his fellow engineers, but his dull brain balked.

"Mr. Jenkins!" He must have fallen asleep, for a nurse was joggling his arm. "Doctor'll see you now."

Worringer sat behind a huge nickel desk in a glittering nickel consultation room. He nodded at a chair and laid aside his ophthalmoscope and stretched his gaunt body wearily, his hollowed black eyes peering at Jenkins with a solemn mortuary sympathy.

"Are they going to die?" Jenkins

tilted his head anxiously toward the emergency ward. "Any of them?"

Deliberately, the bearded specialist put on a pair of heavy-rimmed glasses, through which he scowled sternly at Jenkins.

"All the skin and serum tests show radiation burns of the severity we designate as the fifth degree. That means a prognosis of death within eight to twelve days, depending upon the individual resistance and response of the patient."

Jenkins gripped the arms of his chair.

"But you're treating them!" he gasped. "Won't that help?"

"Not enough." Worringer's brows wrinkled to a grim professional frown. "Untreated, none of you would last a week."

Jenkins tried to swallow the stiff, dry numbness in his throat.

"My . . . my own case?"

"Geigers are seldom wrong, Mr. Jenkins. Your own tests show the same exposure." Worringer's dark eyes glared at him, as if in anger at the folly of all men who tried to work the seetee drift. "However," the gaunt man added solemnly, "you are a little luckier than the rest. I can offer you one chance in ten of complete recovery."

Leaning forward, Jenkins wet his lips and listened desperately.

"Nothing certain, Mr. Jenkins." Worringer shook his dark head, impatiently. "But I've been experimenting with a radical counter-radiation therapy—a heavy exposure to selected hard frequencies. Oc-

asionally it appears to stimulate complete regeneration of the injured tissues. More often it merely hastens the general decay. The results are not so far predictable."

Worringer scowled belligerently, adding:

"Most fifth-degree patients are glad to accept that gamble."

Jenkins wet the sticky dryness of his lips.

"But I can't," he whispered huskily. "Because I need those eight or twelve days of time."

Worringer glowered through the beard, rasping harshly:

"Don't be foolish, Mr. Jenkins. You only risk a week of life. With luck, you can win a normal lifetime. It will pay you to weigh the odds."

Jenkins straightened stiffly in his chair, fighting a kind of roaring numbness that tried to seize possession of him.

"I need that week," he muttered faintly. "Every day of it. You see, we've an unfinished job on Freedomia that has to be completed. I must carry on, until the other engineers are able to take over."

Worringer frowned at him, forbiddingly.

"Is any job that important, Mr. Jenkins?"

He nodded quietly. He couldn't tell Worringer how desperately important it was, but he had to find eighty tons of condulloy. If he had that metal ready when the engineers came out of that ametine coma, the Brand transmitter might yet be

started before war swept the Mandate.

He had to swallow before he could ask:

"How . . . how much time can I count on?"

"To arrange your affairs?" Worringer studied him thoughtfully. "With the treatment you've already had, you should be capable of moderate physical activity for—say four to six days."

Jenkins sank heavily back in the chair, with a mute protest on his lips. For that was not long enough. He sat staring at the bearded man, numbed with a gray despair.

The theft of those missiles and tools from Freedomia, it seemed to his reeling brain, and the treachery of Lazarene, were all a kind of seetee shock that the whole human race had suffered. Men didn't feel it yet, any more than his own body did.

But dreadful death had already struck.

Even now, he knew, at some remote rendezvous in space, men must be arming a secret fleet from Venus or Mars or the Jovian Soviet with those stolen contraterrene missiles. Or was Earth herself the guilty planet?

Lazarene was an Earthman—but that fact was no very useful clue, because the silent, sallow-faced engineer had asked for news of his old instructors at Panama City when Jenkins first arrived, with the wistfulness of long exile. One of the



few top-drawer Earth-trained engineers not under contract to Interplanet, he must have been employed at one time or another, Jenkins knew, by Venus and Mars and the Jovians. Which one had bought his final loyalty?

Time would answer that question—with the sudden fall of contraterrene death on unsuspecting and

defenseless planets. That suspended peril seemed to Jenkins like a sort of planetary seetee shock—and the desperate treatment he wanted to try appeared as grimly uncertain as Worringer's radiation therapy.

He straightened in the big chair, wiping absently with his handkerchief at the cold wetness on his

ASTOUNDING SCIENCE-FICTION

forehead, and tried to listen to the bearded man.

"... advise your return to the clinic at the first indication of the final degeneration," Worringer was rasping bleakly, "when you begin vomiting, or notice any minor hemorrhage. That will be too late for any experiments with counter-radiation, but we can at least make the terminal period less intolerable."

"I'll be busy," Jenkins said huskily. "I don't expect to be here."

Worringer scowled at him impatiently.

"Young man, do you know what radiation sickness means?"

"I—" Jenkins gulped uncomfortably. "I think so."

"Blindness"—Worringer blinked severely through the glasses—"from hemorrhage of the retina. Occurring, in your case, in six to eight days."

Jenkins waited, cold and numb.

"Tissue breakdown." Worringer's voice seemed needlessly harsh and loud. "The injured cells slowly die. There is increasing hemorrhage—from minor cuts, from the nose and throat. The slightest bruise causes bleeding under the skin. Meantime, the blood-making cells are dying."

Jenkins nodded feebly.

"Fever," rapped the bearded man. "Diarrhea. Emaciation. Baldness. Necrosis. Dead tissues sloughing from the mouth and throat. Death—as sure as if your throat were cut. That's your outlook, Mr. Jenkins,

unless you decide to stay for treatment."

"And probably anyhow?"

"True." Worringer's dark shaggy head nodded unhappily. "Counter-radiation appears to stimulate recovery of a few fifth-degree cases. Less severe cases can sometimes be saved by the older treatments—rutin to slow the bleeding, intravenous feeding, synthetic plasma and proto-hemoglobin to replace the dying blood. The emergency intravenous injection you just received contains specifics which somewhat increase resistance and retard disintegration. But the most we can really promise you, Mr. Jenkins, is death without pain."

Worringer sighed and looked at the clock on his desk.

"We talk of medical triumphs!" he rasped moodily. "But that, two centuries and a half after Hiroshima, is the best we have accomplished." He cleared his throat, with a sudden harsh sound. "If you decide to stay, Mr. Jenkins, we must start the treatment at once."

Jenkins stood up. His knees felt shaky, but he tried not to show it. He caught his breath and shook his head.

"No, doctor." The calmness of his own voice surprised him. "I'll have to carry on with our work on Freedonia until some of the others are able to work again. Please arouse them from the ametine coma as soon as you can. I imagine most of them will decide to try your

radiation treatment, and surely a few—”

Worringer checked him, with an angry snort.

“Nonsense, Mr. Jenkins,” the bearded man barked sharply. “Those panicky fools all inhaled ten times too much ametime. It will take them a week to throw it off, under the best care we can give. By that time it will be too late to experiment with the radiation therapy.”

He glowered through the glasses.

“I’m afraid you’ll have to do your work alone, Mr. Jenkins,” he added gloomily. “Or find some other help. Because ametime would counteract the cell-stimulus we hope for in the radiation therapy. There’s nothing I can do for any of these men except to ease their last hours. And they’ll just about wake up in time to die.”

Jenkins sat down again, heavily.

“I . . . I see,” he whispered huskily. A roaring darkness flowed around him, and slowly receded. He heard his own flat voice saying quietly: “If you please—I’ve one request.”

Rising, Worringer paused impatiently.

“Please,” Jenkins asked, “don’t tell anybody I’m going to die.”

“I won’t talk. Worringer nodded brusquely. “Professional ethics.” Unexpectedly he smiled through the beard, and came striding to grasp the hand of Jenkins. “And I hope you have time to get your work completed!”

VII.

Jenkins went out reluctantly to break the news.

The town of Obania was a single sleepy street of neglected, rust-colored buildings, beneath black cliffs of naked iron and a sky blacker still—for the thin wisp of synthetic atmosphere, held by the selective attraction of the terraforming field, was too shallow to diffuse the cold sunlight.

Jenkins found Karen Drake in paint-stained overalls, her red hair bound in a green handkerchief, spraying aluminum paint on a little house at the foot of the street. The first glimpse of her somehow gave him a throbbing regret that she wasn’t Jane Hardin, waiting for him.

But the time was far too late for such futile thoughts as that. He bit his lip and shook his head and called to the girl across the street, as calmly as he could. Rick Drake’s wife stopped her spray-gun and tripped gracefully down her stepladder to meet him, smiling gayly.

“Why, Nick!” Her throaty voice still had the crisp accent of Earth. “It’s about time you had a leave! Rick wrote me that you were trying to burn yourself out on that mining machine—and you do look sort of used up. We’ll find you something brighter to think about than your chance of seetee shock!”

Jenkins shook his head miserably. He caught his breath to speak, and found that he couldn’t kill the light

in her eyes and the warmth of her smile—not yet.

"How's Rick?" he heard her asking. "He wrote that he's coming home next month," she went on happily. "He said the work on Freedonia is nearly done, and now he won't have to be away so much. Ann's helping me get the house ready—she's inside now, painting furniture."

Drake's wife turned to survey the bright new aluminum paint, with a smiling approval.

"Don't you think Rick will love it?" she inquired. "I've been staying with Ann, in the old O'Banion house, but she'll need more room when the baby comes. This was a rusty-looking old place, but the metal's still sound." She caught his arm. "Come in and see Ann."

Jenkins followed dazedly, feeling ill.

They found the youthful Mrs. Paul Anders in the small kitchen, her brown, intense face smudged with the red paint she was brushing on the chairs.

"Hello, Ann."

Startled, Ann moved self-consciously to hide her body behind the red-painted table. Her quick gray eyes looked at his sick face, and read what he hadn't been able to say. She caught at her throat and screamed.

"Paul!" she sobbed. "What has happened to my Paul?"

Jenkins shivered, staring mutely at the little can of red paint. It had dropped from her stricken hand.

The stiff crimson liquid was spreading slowly, unnoticed on the floor, terribly like blood. Like the blood of this girl and her child, he thought bleakly, if seetee war struck.

"Tell me!" she gasped. "Is my husband—dead?"

Jenkins wet his lips. Perhaps he should have let the clinic call them. There wasn't any easy way. He tried to swallow, and heard his own hoarse voice rasping:

"Not yet. But I brought him to Dr. Worringer." Karen Drake's face had turned so white and terribly bleak that he could scarcely go on. He nodded, to the dreadful question in her staring eyes. "And Rick," he whispered. "And Mr. Drake and Rob McGee and all the rest."

The scarlet pool kept spreading on the kitchen floor.

"Are they going to die?" Ann was whispering faintly.

He nodded again, turning abruptly to keep from seeing the flowing paint. The woman dropped her brush and stumbled clumsily away from the table. The red smear across her body made him ill again. Sharply, she was gasping:

"We must go to them."

"There's no rush." Jenkins shook his head, looking away from the dry-eyed agony twisting her face. "They're all under ametine. Worringer says it will take a week to wake them." Dull-voiced, he added, "They all have fifth-degree seetee shock."

Nobody would have to tell them the meaning of that. The vomiting.

The hemorrhages. The fever. The blindness. The sloughing tissues. The blooming and the ripening of death. For they had lived, he knew, with the fear of this, and the knowledge was cold and dreadful on their faces. Karen's eyes clung to him, dark as the dilated eyes of the stricken men, urgently imploring. She asked very softly:

"How did it happen?"

Jenkins shook his head uncomfortably.

"I don't know." He trusted these two loyal women as far as he trusted himself, yet he dared not tell them. For one whisper of the treachery on Freedonia might shatter the Mandate and his uncle's corporation—and break his only hope of obtaining that eighty tons of condulloy to finish the Brand transmitter.

"I was out on a mining expedition with the seetee bull," he said slowly. "It happened while I was gone, and they were all unconscious when I found them." He looked at Karen's bloodless face, and tried to forget that spreading red on the floor. "Please—" he added hoarsely, "won't you tell the families of the other men?"

She nodded quietly, and he turned back to Ann.

"I'm going to talk to your father."

The Seetee warehouse was a long new building of bright sheet metal, beside the spaceport that capped the planetoid's north pole. It's cool obscurity was filled with crated machine tools and drums of refined

oxygen and cadmium cans of precious enriched fuel uranium and cartons of dehydrated food for Freedonia. There were stacked ingots of lead and cadmium and copper—but Jenkins wanted condulloy.

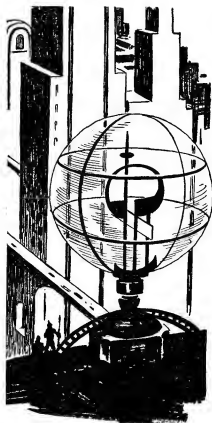
He found old Bruce O'Banion sitting at an untidy desk in the little corner of the warehouse that was partitioned off for an office. A heavy man, the aging asterite pioneer was red-faced, thick-jowled, big-featured, somehow impressive with the white flow of his shaggy mane. The hang of his heavy lips showed a brooding bitterness.

For greatness had just escaped O'Banion. An asterite leader in the revolution, he had been provisional president of the brief High Space Union. The allied planets had made him large promises, and betrayed him with the cynical device of the Mandate. Twenty years of defeated futility had left an ugly print upon him, and he seemed to feel that this warehouse job was too small for his abilities.

"Hello, Mr. Jenkins." He heaved himself erect behind the cluttered desk, smiling with a cordiality that few men received from him—a warmth really intended, Jenkins thought, for the wealth and fame of Martin Brand. "How's your uncle?"

"I'm just on my way to Pallasport to see him," Jenkins said. "I've bad news for him—and for you."

O'Banion sat down heavily as Jenkins began telling of the disaster on



Freedonia. His sagging face turned ashen, and gleamed with sudden sweat. The heavy lines of weary bitterness cut deeper when he heard that his old associates and his daughter's husband were dying of seetee shock.

"Dreadful!" he gasped. "Ann will be prostrate."

Yet it seemed to Jenkins that the old asterite showed something more than grief. His pudgy hands began to quiver, and his breath became a

SEETEE SHOCK

hurried rasping. His blood-shot eyes searched Jenkins, cold with a sudden narrowed alertness.

"So now one planet is ready for seetee war," Jenkins finished hoarsely, watching the trembling man with puzzled eyes. "And the new owners of those missiles will have to strike soon, to cover up their crime."

He had told everything, except the irrelevant fact that he himself was dying. For O'Banion had been a politician and a financier. He would understand the damage a rumor could do, and he would know how to help.

"Most alarming, Mr. Jenkins!" The old man was fumbling nervously with the cluttered papers on the desk. His voice was high and tight and breathless. "Which planet do you suspect?"

Bewildered, Jenkins shook his head.

"All of them," he muttered. "I didn't find a clue."

"Most alarming," O'Banion wheezed again—and Jenkins thought his narrowed eyes showed the glitter of a grim elation. "Too bad there's nothing we can do about it."

Jenkins leaned urgently over the desk.

"But there is," he said softly. "We can—we must start the Brand transmitter!"

O'Banion merely stared, stubbornly shaking his shaggy white head.

"And you can help," Jenkins

whispered urgently. "I'm taking off for Pallasport. I want you to call my uncle on the private beam, and arrange for me to pick up a shipment of metal Mr. Drake has already requisitioned—eighty tons of condulloy."

The heavy old man squirmed uncomfortably in his chair. His evasive, hostile eyes shifted toward the doorway, as if he wanted Jenkins to go.

"Another thing," Jenkins went on grimly. "I want you to find two or three spatial engineers willing to work a few days in those residual radiations on Freedonia—just in case Drake and the others aren't able to help with the installation."

And in case, Jenkins added silently, he himself was dead.

O'Banion uttered a harsh snorting sound, lurching to his feet impatiently.

"Don't talk nonsense, Mr. Jenkins!" he advised abruptly. "I don't know any spatial engineers who want to commit suicide with residual radiations. And I'm afraid you won't get that condulloy."

"Why not?" Jenkins demanded. "My uncle promised—"

"Here's why!" O'Banion's fat fingers riffled hastily through papers speared untidily on a metal hook. "Here's Drake's requisition—and your uncle's answer!"

Jenkins took the flimsy yellow sheet, to read Brand's bold hand-printing:

"Sorry, Jim. Do you know con-

dulloy costs two millions a ton? Suggest you think of something cheaper. Cordial regards. M. B."

Indignantly, Jenkins crumpled the sheet.

"Brand promised that metal," he whispered bitterly. "And there's nothing cheaper. Condulloy is alloyed from isotopes of platinum and osmium and iridium. It can't be cheap—but one gram will carry more current than a ton of copper. Nothing else will do." He caught his breath sharply. "I'm going after that metal."

"Don't be a fool, Jenkins." O'Banion waddled impatiently to open the door for him, visibly anxious to be rid of him. "That drift is hell in chunks, and men will never work it. I always told Drake—"

"Just a minute," Jenkins protested. "Let me call my uncle."

"Can't do it now." Slowly reddening with a poorly concealed annoyance, O'Banion shrugged at a grimy timetable pasted on the metal wall. "You'd have to wait about four hours for Pallasport to rise into line of sight. Got time for that?"

Jenkins shook his head, watching the old man's relief. Frowning with puzzlement, he checked himself in the doorway. He wanted to know the reason for that veiled elation and cold suspicion and covert impatience—he felt disturbed by the whole attitude of the sullen old asterite. But his life was running out. He had no time for anything except the Brand transmitter.

"I'm going on to Pallasport," he said flatly. "Please call my uncle when you can. Tell him to have that metal ready."

O'Banion merely snorted scornfully, holding the door.

Jenkins hurried back down that single street of rusty buildings between the dark iron cliffs, trying to shake off a feeling of bewildered unease. He couldn't understand the veiled hostility of Bruce O'Banion, but clearly the embittered old pioneer didn't mean to help.

But O'Banion didn't matter, he told himself hopefully. For he could depend on his famous uncle to find the metal—perhaps even to help with the installation. Martin Brand, he reminded himself, was the greatest of the spatial engineers.

Hastening back to the ship, Jenkins tried to see this tiny world as the boundless power of seetee could make it. These cruel iron crags could be leveled. Synthetic soil could cover them, and manufactured water nourish them to life.

For energy, to the engineering mind of Jenkins, was the substance of life. The might of seetee meant a more splendid sort of life for men.

Perhaps it would be too late to save the men dying in the Worringner clinic, but soon Ann would bear her child—

Jenkins hurried past the clinic building without going inside. Ann and Karen and the other wives and relatives would be there now, he knew, crying over the lax bodies on the beds or standing tightly silent in their grief, and he didn't want to see them.

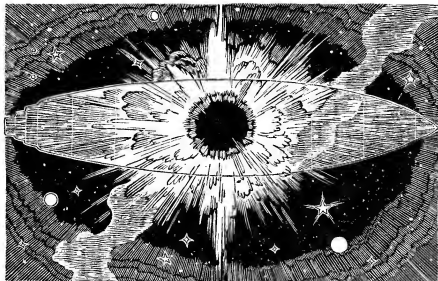
Behind the clinic, he walked through a crooked radiation trap into the safety well where he had left the drift-battered *Good-by Jane*. A fluorescent sign, which the clinic attendants must have posted on the air lock, checked him briefly with its red-lettered warning:

CONTAMINATED CRAFT!
Dangerous Radiation
DO NOT APPROACH

Grinning wryly, Jenkins ripped off the poster and tossed it aside. Dangerous radiation didn't matter to him now. He closed the valves and climbed the ladder to the pilot-house and lifted the rusty tug toward far-off Pallasport.

TO BE CONTINUED

★ ★ ★ ★ ★ ★ ★ ★ ★



A PRESENT FROM JOE

BY ERIC FRANK RUSSELL

The Martians had their own ways of doing things; they needed uranium, had none, and were quite able to trick Earth into an unwitting, unwilling donation. . .

Illustrated by Orban

"Then," continued Queth, with suitable condescension, "in those days of long ago it was estimated that the rate of dehydration gave us no more than four thousand years to live. After that—the end!"

Fernith gave a shudder and piped: "So we are going to die?"

"No, no, of course not." Queth paraded importantly around the huge projection room. Here, surrounded by the gigantic instruments of his

planet's science, he cut an imposing figure; he had majesty too great to be worth impressing on any mere child. But Fernith was not any mere child. He was the only son of the Overlord, the next in natural succession, and Queth's boss-to-be. "No, we shall not die," assured Queth. "Our ingenuity will save us in good time."

"How?"

Queth sat down, passed a hand across his great brow. How to explain ten centuries' accumulation of technicalities, briefly and clearly? Mentally, he consigned Fernith to perdition while outwardly he managed to look profound.

"We shall migrate to another and better planet," he said at last.

"How?"

"In spaceships."

"All of us?"

"No, not all of us. We are far too many." He sought for words. "The most worthy of us. You and your father and the scientists and warriors and those we think best fitted to live."

"And the others will stay here and die?"

"I am afraid so."

"Serves them right," observed Fernith, callously. "Supposing there are people already on this other planet?"

"There are. We'll keep some for our own use, and dispose of the others."

"They'll die, too?"

"Definitely," promised Queth. "We won't have much choice about

it. We'll have to push them out of existence to make room for ourselves. That's as it should be. The lower forms of life must give way to the higher."

"Oh, wonderful!" enthused Fernith. "Plenty of killings! Will it be soon?"

"We aren't quite sure about that."

"Why not? Why can't we start now?"

Queth sighed, favored the projector feed-lines with a martyred look. "Because we can't traverse space without spaceships—and we haven't any spaceships."

"Why not?"

Pausing to murmur something under his mental shield, Queth replied: "Because we haven't any konium."

"What's konium?"

"It's a special element of tremendous explosive power. It is the only power-source potent enough to drive a ship through space. There is none of it on this world, not one little bit, not an ounce."

"Is there some on the moons?" Fernith persisted.

"It is doubtful," said Queth, cautiously. "There may be—but not much."

"Why can't we get it from the moons?"

"Because, my dear Fernith, we must have konium even to reach the moons. We are in the awkward position where we must have konium to reach sources of konium."

Fernith thought it over while the other watched him covertly, then

he asked: "If we haven't got any, how do you know that there is any anywhere?"

"We deduced its existence theoretically, worked out its properties mathematically, and finally detected it spectroscopically," declared Queth.

"What's all that mean?"

"I suggest you ask your father," Queth snapped, his patience evaporating. Hastily, he added, "He is a great and clever man." He moved toward his desk. "Please pardon me. I am very busy."

With much relief, he watched Fernith wander out. Darn the kid. Just like his autocratic parent, nose, interfering, unscrupulous, blood-thirsty.

Dismissing the child from his mind, he applied himself to checking the mechanical shift of the overhead battery of huge antennas. At all costs they had to be kept beamed on that precise point in space, that fateful point from which might come salvation.

Ronsed entered in the early evening, flopped into a chair, and said: "The checkers have just reported. It has come off."

"You mean—?" Queth looked at him.

"Yes, they're at war again. I offer you my congratulations." Ronsed settled himself lower. "The prognosticators were wrong in time by six years, but what are six years? They proved correct in the end." He studied Queth worriedly. "I hope they continue to prove

right. Heaven help us if they don't!"

"Always the pessimist," said Queth.

"Pessimism has nothing to do with it. Rather is it a matter of not underestimating one's opponents."

"Collaborators," Queth contradicted.

"Opponents," insisted Ronsed. "One does not slaughter collaborators."

"Not until they cease collaborating," Queth observed, cynically.

Ronsed fidgeted in his chair and was silent a long time. Then he grumbled: "I have forebodings. As long as I have known about this scheme I have had direst forebodings. The plan is faulty. It embodies an arbitrary assumption that may be the death of us yet."

"What assumption?"

"That these creatures on the other world lack sufficient native intelligence to discover what is happening and who is doing it."

"Pish!" exploded Queth. "What have the checkers just told you? What did you come here to tell me? That they are at war again, precisely as planned! Millions of blind mice—see how they run!"

"I'll give you that. Everything has worked out nicely to date. But it has to keep on working right up to zero hour." He glanced at the calendar. "And the sands of time are running down. A mere six hundred years—all that's left out of four thousand!"

"No matter," scoffed Queth.

ASTOUNDING SCIENCE-FICTION

"The psycho-charts show that they're being speeded up satisfactorily, and that we should be through with the scheme in less than one third of the time left to us. That time-margin makes success almost a certainty."

"I'm glad you said *almost*."

"You have about two hundred years of life ahead of you," Queth went on. "I will gamble that we triumph within your lifetime. You'll live to see it."

"Maybe." Ronsed shrugged skeptically. "And maybe not."

The door opened, Harna came in saying to Queth, "Heard the news?"

"Yes, Ronsed told me."

Harna squatted on the edge of a table and wrinkled his eyes at Ronsed. "What do you think of it, Gloomy?"

"It's working all right—so far."

"So far!" echoed Harna. He turned his attention to Queth. "He's at it again, eh?"

Ronsed said, sharply. "There's nothing wrong with me. My glands are as good as yours. My digestion's as good as yours. My imagination is better."

"Imagine me a few things," invited Harna, amusedly.

"We've developed a science so wonderful that we're bemused by it, and forget that it's peculiarly our own." Ronsed pointed to the sky. "I can conceive them having things just as peculiarly their own."

"You'd better enlarge upon that," Queth put in.

"We are telepathic wizards," obliged Ronsed, determinedly, "far, far ahead of these bipeds whom we are influencing. We can amplify, project and receive on neural bands common to ourselves and the bipeds. We can even send telepathic beat transmissions which send back pulses. All this means that we can examine and influence their minds over immense distances. We can comprehend their world and their mode of life so far as those things can be understood by our readings of alien minds. Within limits, we can warp them in ways best suited to our purpose. But it isn't enough. Basically, their minds are not like ours, and the difference is dangerous because unknown."

"But—" began Harna.

"I've not finished yet. Do you remember that report on conversational hiatus? It proved that the bipeds have a nontelepathic method of communication which even now we do not understand. It showed that two bipeds holding conversation don't necessarily broadcast thought-responses in logical sequence. Ergo, one of them, or both, must be communicating by other means something that does not correspond with his thoughts, something false, something calculated to conceal rather than reveal his mental flow. What is this other means? We don't know! How much more don't we know?"

"We know how they react to our stimuli," said Queth, shrewdly.

"We know how the mass of them

react," Ronsed retorted. "But suppose that a few of their cleverest minds get curious about the same phenomenon? How are we going to pick *them* out and thus be warned? We haven't the selectivity to rake through that telepathic uproar for a few big-brains. Whenever we do manage to sort out a couple of individuals we get them haphazardly, by sheer luck."

"I don't see your point," protested Harna. "We know that they detected our pulses twenty years ago, and promptly dismissed them as natural phenomena. That's good enough, isn't it?"

"It's good enough until some nosey individual correlates ray-intensity with hysteria, charts both, proves a relationship, and finally traces the beats to a common source in space—here! *How do we know someone's not doing it now?*"

"Guesswork," sneered Harna. "Your brains are addled. May the Red Sun be your protector if the Overlord hears of this!"

"What have you got to offer against it?"

"This," Harna shot back. "What we *do* know. That this other world has konium in plentiful supply. That its people are capable of building konium-powered spaceships and eventually would have built them anyway, without any suggestions from us. That, if sufficiently stimulated by us, their science can be speeded up, they can conquer space and be induced to come here in good time to save our skins. We know

that we can persuade them to build what we cannot manufacture, to bring us what we haven't got. We know that we can use them by remote control, and conquer space by proxy! Lastly, we know that since we can influence them at this distance, we can make them our mental slaves once we're established on their world. What more does anyone want than that?"

"Never in all my life did I more sincerely hope that you are right and I am wrong," Ronsed got up, went to the door. "But I never take things for granted when dealing with unknown quantities." He shook his head slowly from side to side and went out.

"Much intelligence and little faith," Harna commented sardonically. "So sad!"

"When we start out for our new home do you suppose that Ronsed will be among those present?" asked Queth.

"No." Harna stared blankly at the wall. "We conquerors will have no room in our ranks for such a quivering fat-belly."

As time went on the reports of the checkers created a series of gala days.

"The war grows and grows."

"Frenzy-impulses have brought them to the boil."

"The war has extended to a world-wide conflagration."

"Stark demands of survival are giving their science a tremendous impetus."

Upon the twelfth day of the Double Moons—and Fernith's birthday—came the great news, "They are using rocket missiles."

The Overlord announced a public holiday. Joyously waving their flame-bulbs, great crowds made marches of adoration through the streets, filled with neural bands with such a medley of congratulatory messages that listening checkers temporarily lost touch with the other planet.

Later, much later, the Overlord himself made the broadcast: "They are using konium! In celebration, I declare this a free day!"

The crowds were twice as great, and the checkers lost contact for a full planetary revolution. So great was the telepathic uproar that some of it seeped through the screens of the projector room, causing Queth to seek solace with a bottle.

The bottle's bright green and potent contents were halfway down when Ronsed arrived. Queth burped, eyed him glassily, pushed the bottle toward him.

"Drink," he invited. "It may help you to withstand laughter aimed at fools."

"The last laugh has yet to be heard." Ronsed waved the bottle away. "Now they possess konium and rockets. Add those two items together and you have the result you want, the result of centuries of conspiracy—or have you?"

"Why not?"

"Because certain of them may

have secret knowledge and secret thoughts."

"Bushwa!" defined Queth, unhesitatingly.

"Or if they haven't, they may acquire them before they're due here."

"Go away," Queth suggested. "Go away. You tire me with your eternal miseries." He sucked the bottle noisily.

"Then let me likewise tire the Overlord."

"Eh?" Queth almost dropped the bottle.

"I crave an interview with the Overlord."

"You're drunk!" Tilting his bottle, Queth emptied it, burped twice in rapid succession, looked blearily at the other. "Drunk as a tele-maniac checker!" He ruminated awhile, then added: "About what do you wish to see him?"

"About the salvation scheme. I think it ought to be altered before it's too late."

"Oh, you do, do you? After many generations of careful psychological planning, Ronsed comes along and says it ought to be changed. By the Red Sun, that drink must be strong—it makes my mind credit you with the craziest thoughts."

"You're receiving me all right. I think the plan is wrong. I wish to say so to the Overlord, and explain why, and suggest that it be changed."

"In what way?" Queth queried.

"I believe that we should use our telepathic projectors to reveal ourselves openly to these bipeds, to

tell them of our predicament and ask their assistance."

"You think they'll give it?" asked Queth, incredulously.

"I don't know," Ronsed admitted. "But I feel that we'll stand a better chance meeting them squarely."

"Nonsense! Stuff and nonsense! We shall conquer them, completely and absolutely, with our own wisdom. They will find themselves confronted by a set of circumstances impossible to foresee because, to them, our genius is utterly alien. Before they can realize it, we shall have fastened them with fetters of their own ignorance."

"My dear Queth," commented Ronsed, "has it not occurred to you that they may possess wisdom equally as alien?"

"I overlook nothing. All things have occurred to me," Queth boasted, "including the fact that you are a miserable nuisance. With your ifs and buts and maybes you are a menace to general morale, so much indeed that the Overlord would have your hide if he knew but the half of it." Queth studied the other disdainfully. "Your application to interview the Overlord is hereby rejected."

"You will not permit me to see him?"

"Certainly not! Do you think I crave punishment for causing his mind to be afflicted by such thoughts as yours?"

"May the stars grant that these bipeds prove as dull-witted as you expect," prayed Ronsed. He went

slowly to the door, held it open, and added: "If success does come, Queth, your greatness will be recognized and the Overlord will reward you as none have been rewarded before. But if you fail, you will not know how greatly you have failed. You will be dead!" He closed the door behind him.

Queth kicked the bottle across the room, gazed irefully at the door. Ronsed and his persistent moanings! He directed his glare of annoyance at the door for some time, finally fixed the neurophone on his head, swung its antenna until the beam pointed at the distant Records Office.

"See that the name of Computator Ronsed is placed upon the list of those forbidden to migrate," he ordered.

The thought-waves of Harna came back, saying, "It will be a pleasure. Has he been worrying you again?"

"Yes, he spoiled my quiet hour with a bottle."

"Too bad," Harna sympathized. "I wonder that you have endured him so long. It's a pity that you cannot have him transferred to the Eastern Desert where he may nurse his stupid apprehensions in solitude."

"That's an idea." Queth mulled it over, then went on, "I shall enter a complaint with the Overlord. He will take action. We shall be well rid of this prophet of despair by tomorrow's eve."

"You owe me a bottle for the suggestion," said Harna, with prompt



opportunism. "I will split it with you the hour Ronsed departs." He managed to beam a mental snicker before he cut off.

The old Overlord had passed away and suffered his ceremonial cremation, and Fernith had sat for twelve long years in the seat of power by the time the bipeds reached their own satellite. Checkers sitting and listening through anxious, excited watches had anticipated the event for months, but no hint of what was expected had been allowed to reach the public.

When at last the news broke, Queth took it in person to Fernith. Marching importantly into the presence, he genuflected with the minimum of reverence as became his own high station.

"Your mightiness," he announced, "the bipeds have burst into space."

"Ah!" Fernith clutched the arms of his throne. A reddish gleam crept into his eyes. "They have landed on their satellite?"

"Yes—with ten ships. They launched twelve. Only two failed to make it. The others are now upon their moon."

"That is good, extremely good!" Fernith coiled his tentacles with satisfaction. "Let it be known that I declare three days of freedom."

"It shall be announced," Queth promised.

"And now, what do the prognosticators say?"

Queth frowned. "Your mightiness, they declare that the moment has arrived for you to call a council to consider our strategy afresh.

There is a difficulty about which our best psychologists are divided."

"A difficulty?" Fernith fastened hard eyes upon him. "What difficulty can there be?"

"It is this: that the bipeds can be motivated by us only so long as our suggestions are not in blatant contradiction of facts. Now their arrival on their moon has lent importance to a fact which is awkward for us insofar as it may cause great delay in their attempts to get here."

"And that fact is—?"

"That the morning star—the planet Sarken—is nearer to them. We are almost twice as far away. It is logical for them to try and reach Sarken first." Queth made a gesture of disgust. "If they get to Sarken they may waste a thousand years exploring and settling it before they decide to come this way—unless we can devise some means to make them ignore Sarken in favor of us."

"But Sarken is uninhabited and uninhabitable," countered Fernith. "We have never been able to pick a single thought from its great blanket of atmosphere."

"Perhaps its atmosphere has the faculty of screening all underlying thoughts," Queth ventured. "Or possibly its life forms think in frequencies far outside the range of our receivers. But that is not the point. The point, your mightiness, is that we must find a way to persuade the bipeds to come here before it is too late—and that will be diffi-

cult because it will be contrary to logic."

"Then I shall summon the council," Fernith decided. "A means must be found somehow, anyhow. It is a matter of life or death to us." He gave a harsh chuckle and finished, "Life or death to these bipeds also."

"Yes, your mightiness," agreed Queth, laughing dutifully.

The council was in session all through the night. The situation, they agreed, created something of an impasse. It was not until the early hours of the morning that Alrath, most respected expert on biped psychology, ended the discussion.

"It is of no avail to stimulate yet another world war," he said. "The biped tribes have united since the last great holocaust and they need all their unity to cope with space-conquest now that it has reached its present stage. If, as Werkin suggests, we afflict them with a new ideology they will divide and waste their energies. The time for stimulation by warfare has now gone by."

"Then we are left only with that imbecile Ronsed's suggestion," put in Queth. "That we draw them here by revealing ourselves openly."

"Not at all," Alrath contradicted. "The Red Sun forbid that any of us should listen to Ronsed. If anyone desires partnership rather than mastery, he is mad!" His challenging gaze went round the table. "These bipeds have much curiosity and great ambition. We know that

—for those are the psychic factors we have manipulated successfully for centuries. Let us continue to manipulate them.”

“Go on,” ordered Fernith.

“Consider the situation. Do they reach their moon with one modest spaceship? They do not! They send twelve and ten get there. Next year, they will send fifty. The year after they will be ready with a hundred. Their ambitions are equaled only by their energy.”

“So?” prompted Fernith, eagerly.

“So I think it will not be too hard to obsess them with the notion of trying to reach *both* planets, Sarken and ours. The suggestion will be acceptable to them because it does not contradict the logic of Sarken’s nearness, while, at the same time, it appeals to their ambitions—a double triumph rather than a single one.”

“But surely that will halve their efforts as far as we are concerned,” someone objected.

Alrath gave him a look of scorn. “Do we care whether they land fifty ships on Sarken so long as they land one here? One is enough—one ship capable of taking back one trained mind-master. After that, *all* their vessels will come to this world!”

A murmuring ran around the council table until Fernith hushed it with: “Do all agree with Alrath’s plan?”

“It is the best,” they said.

“Then I so order it!” Fernith glanced at Queth. “Direct the

broadcasters to transmit the urge to double-conquest, continually, without cease.”

“We have to cease when we’re on the other side of the sun,” a mind observed, incautiously forgetting its shield.

Catching the thought, Fernith purpled and roared: “Do you think I don’t know *that*, idiot! Even as a whimpering babe I learned that we strengthen and fade as we near or leave the bipeds’ planet. Why, even those silly, servile two-leggers can realize—” He paused, appalled at where his anger was leading him. A silence lay around the table, a brooding, slightly fearful silence.

Ronsed was halfway through his twenty-seventh year of grim exile in the Eastern Desert. A dull red sun hung low in the sky and a thin wind was stirring the dry, pink-colored sands. Sitting at a window, he gazed absently at the barren, uninspiring scene of which he had long grown weary.

That morning, the world-wide neurocast had announced the rationing of water, first fateful sign of the long expected end. From now on there was to be a fixed amount of the precious liquid per person per day. That world of the bipeds had plenty of water, in fact it was more water than land. The fact had been known long before they’d had telescopes to confirm it, for they had garnered the information from biped minds. One does not tend to develop other-worldly types of scien-

tific instruments when one's own types are nearly as good.

Yes, nearly—but not quite as good. The telereceivers were blind to worlds without minds, or rather to worlds which did not release detectable thoughts—worlds like Sarken, for instance. They had known surprisingly little of Sarken or any other nonbroadcasting planet until they had picked telescopes and spectroscopes out of bipeds' brains. Undoubtedly, the bipeds were supremely clever in their own strange, alien way—Too clever for comfort.

For generation after bloody generation the bipeds had been stirred and stimulated with one end in view, and those who had done it owed them plenty. Was their cleverness great enough to enable them to recognize the debtor, name the debt—and enforce payment?

Shifting uneasily in his seat, Ronsed reached for his neurophone and waited for the evening broadcast. Not one living creature existed within his horizon; the periodic broadcasts from the cities was his only company, his only opportunity to listen to another mind. Such was the least penalty of those who blocked the path to conquest, and he was growing tired of it, so tired that by now he desired the greater penalty—death!

If only Fernith and Queth had been possessed of enough intelligence to appeal to the bipeds, instead of driving them onward with a mental whip; if they had offered co-operation instead of plotting

mastery, there might have been some hope. But now—

He shrugged fatalistically. The neurophone clicked softly within his mind and an excited thought-form came through.

"Six days ago eight spaceships left the bipeds' satellite for Sarken and one for this planet. None of these vessels are visible to us, but we have extracted data on their progress from the minds of bipeds who are watching through their bigger instruments. Our vessel is near and due to land very soon. We are keeping the neurocast open in readiness for the great event."

Ronsed sweated. The telepathic carrier-wave fizzed deeply within his brain while he waited. He regarded his two front tentacles as if he had never seen them before. Their tips vibrated, and were damp.

After a long time, the mind returned with: "The oncoming spaceship has now been observed crossing the orbit of our lesser moon. A curious feature is that we are quite unable to receive its pilot's thoughts in spite of the fact that anticipatory excitement must be causing him to broadcast furiously. It is thought that the ship's load of konium must have a blanking effect."

"Or possibly there is no pilot on board—nothing but a robot," suggested Ronsed to himself. He tried to stop the quivering in his tentacle tips, and failed.

Night had fallen and still he sat there in complete darkness when the

neurocast again spoke over a hushed and waiting world.

"This is relayed from a mobile amplifier. The bipeds' spaceship is about to land at a point north of the city of Kaltrak. It is gleaming in brilliant sunshine. Those with selectorphones may reset and see the vision through my eyes."

Ronsed depressed a switch, closed his own eyes, picked up the faraway scene. It had the eerie, dreamlike quality of all telepathically transmitted pictures.

A huge, shining cylinder was scudding through the sands before the distant observer. It plowed to a halt while a long stream of dust settled slowly behind it. The observer moved forward, neared it. A pair of mind-masters came into view hurrying ahead of him, ready to take over whoever might emerge.

Though phantasmal, the scene was very clear. Ronsed could perceive the fastening clips on the back of the nearest mind-master's uniform, noted that one of them was bent.

As the picture came closer, he could see the streaks left by space-particles on the vessel's metal skin, and a row of lenses resembling scanners, and a four-word name inscribed on the spaceship's prow. He strove to comprehend those queer, angular letters as he looked at the name. They read:

A Present From Joe.

Ronsed stood up, opened his eyes, lost the scene on the other side of his world. For a moment, he stared vaguely at the pall of darkness outside his window.

An instant later the entire horizon flamed with intense white light. He lifted his shaking tentacles to cover his eyes. He did not succeed.

The tentacles and the eyes and the room he was in, and all the ground outside, in fact the whole of the planet Mars became one vast swirl of maddened atoms in approximately two and one-fifth seconds.

The bipeds had solved the problem.

After their own fashion.

THE END.



MANNA

BY PETER PHILLIPS

It was a wonderful food. But what happened to it was considerably more remarkable. Enough to drive a good production engineer crazy!

Illustrated by Cartier

Take best-quality synthetic protein. Bake it, break it up, steam it, steep it in sucrose, ferment it, add nut oil, piquant spices from the Indies, fruit juices, new flavors from the laboratory, homogenize it, hydrolyze it, soak it in brine; pump in glutamic acid, balanced proportions of A, B₁, B₂, C, D, traces of calcium, copper and iron salts, an unadvertised drop of benzedrine; dehydrate, peptonize, irradiate, reheat in malt vapor under pressure, compress, cut into mouth-sized chunks, pack in liquor from an earlier stage of the process—

Miracle Meal.

Everything the Body Needs to Sustain Life and Bounding Vitality, in the Most DEEE-LISHUSSS Food Ever Devised. It will Invigorate You, Build Muscle, Brain, Nerve. Better than the Banquets of Imperial Rome, Renaissance Italy, Eighteenth Century France—All In One Can. The Most Heavenly Taste Thrills You Have Ever Experi-

enced. Gourmets' Dream and Housewives' Delight. You Can Live On It. Eat it for Breakfast, Lunch, Dinner. You'll Never Get Tired of MIRACLE MEAL.

Ad cuts of Zeus contemptuously tossing a bowl of ambrosia over the edge of Mount-Olympus and making a goggle-eyed grab for a can of Miracle Meal.

Studio fake-ups of Lucretia Borgia dropping a phial of poison and crying piously: "It Would Be A Sin to Spoil Miracle Meal."

Posters and night-signs of John Doe—or Bill Smith, or Henri Brun, or Hans Schmitt or Wei Lung—balancing precariously on a pyramided pile of empty M.M. cans, eyes closed, mouth pursed in slightly inane ecstasy as he finishes the last mouthful of his hundred-thousandth can.

You could live on it, certainly.

The publicity co-ordinator of the Miracle Meal Corporation chose the

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victim himself—a young man named Arthur Adelaide from Greenwich Village.

For a year, under the closest medical supervision and observation, Arthur ate nothing but Miracle Meal.

From this Miracle Meal Mara-

thon, as it was tagged by video-print newssheets, he emerged smiling, twice the weight—publicity omitted to mention that he'd been half-starved to begin with—he'd been trying to live off pure art and was a bad artist—perfectly fit, and ten thousand dollars richer.



He was also given a commercial art job with M.M., designing new labels for the cans.

His abrupt death at the end of an eighty-story drop from his office window a week or two later received little attention.

It would be unreasonable to blame the cumulative effect of M.M., for Arthur was probably a little unbalanced to begin with, whereas M.M. was 'Perfectly Balanced'—a Kitchen in a Can.

Maybe you could get tired of it. But not very quickly. The flavor was the secret. It was delicious yet strangely and tantalizingly indefinable. It seemed to react progressively on the taste-buds so that the taste subtly changed with each mouthful.

One moment it might be *omelette au fine herbes*, the next, turkey and cranberry, then buckwheat and maple. You'd be through the can before you could make up your mind. So you'd buy another.

Even the can was an improvement on the usual plastic self-heater—shape of a small, shallow pie-dish, with a pre-impressed crystalline fracture in the plastic lid.

Press the inset button on the pre-heating unit at one side, and when the food was good and hot, a secondary chemical reaction in the unit released a fierce little plunger just inside the perimeter fracture. Slight steam pressure finished the job. The lid flipped off.

Come and get it. You Eat Right

out of the Can it Comes In. Keep your fingers out, Johnny. Don't you see the hygiplast spoon in its moisture and heat-repellant wrapper fixed under the lid?

The Rev. Malachi Pennyhorse did not eat Miracle Meal. Nor was he impressed when Mr. Stephen Samson, Site Advisor to the Corporation, spoke in large dollar signs of the indirect benefits a factory would bring to the district.

"Why here? You already have one factory in England. Why not extend it?"

"It's our policy, Reverend—"

"Not 'Reverend' young man. Call me Vicar. Or Mr. Pennyhorse. Or merely Pennyhorse— Go on."

"It's our policy, sir, to keep our factories comparatively small, site them in the countryside for the health of employees, and modify the buildings to harmonize with the prevailing architecture of the district. There is no interference with local amenities. All transport of employees, raw materials, finished product is by silent copter."

Samson laid a triphoto on the vicar's desk. "What would you say that was?"

Mr. Pennyhorse adjusted his pince-nez, looked closely. "Byzantine. Very fine. Around 500 A.D."

"And this—"

"Moorish. Quite typical. Fifteenth century."

Samson said: "They're our factories at Istanbul and Tunis respectively. At Allahabad, India, we had

to put up big notices saying 'This is not a temple or place of worship' because natives kept wandering in and offering-up prayers to the processing machines."

Mr. Pennyhorse glanced up quickly. Samson kept his face straight, added: "The report may have been exaggerated, but—you get the idea?"

The vicar said: "I do. What shape do you intend your factory to take in this village?"

"That's why I came to you. The rural district council suggested that you might advise us."

"My inclination, of course, is to advise you to go away and not return."

The vicar looked out of his study window at the sleepy, sun-washed village street, gables of the ancient Corn Exchange, paved market-place, lichened spire of his own time-kissed church; and, beyond, rolling Wiltshire pastures cradling the peaceful community.

The vicar sighed: "We've held out here so long—I hoped we would remain inviolate in my time, at least. However, I suppose we must consider ourselves fortunate that your corporation has some respect for tradition and the feelings of the . . . uh . . . 'natives'."

He pulled out a drawer in his desk. "It might help you to understand those feelings if I show you a passage from the very full diary of my predecessor here, who died fifty years ago at the age of

ninety-five—we're a long-lived tribe, we clergy. It's an entry he made one hundred years ago—sitting at this very desk."

Stephen Samson took the opened volume.

The century-old handwriting was as readable as typescript.

May 3, 1943. Long, interesting discussion with young American soldier, one of those who are billeted in the village. They tell themselves G.I.'s. Told me countryside near his home in Pennsylvania not unlike our Wiltshire downs. Showed him round church. Said he was leaving soon, and added: 'I love this place. Nothing like my home town in looks, but the atmosphere's the same—old, and kind of comfortable. And I guess if I came back here a hundred years from now, it wouldn't have changed one bit.' An engaging young man. I trust he is right."

Samson looked up. Mr. Pennyhorse said: "That young man may have been one of your ancestors."

Samson gently replaced the old diary on the desk. "He wasn't. My family's Ohioan. But I see what you mean, and respect it. That's why I want you to help us. You will?"

"Do you fish?" asked the vicar, suddenly and irrelevantly.

"Yes, sir. Very fond of the sport."

"Thought so. You're the type. That's why I like you. Take a look at these flies. Seen anything like them? Make 'em myself. One of the finest trout streams in the

country just outside the village. Help you? Of course I will."

"Presumption," said Brother James. He eased himself through a gray-stone wall by twisting his subexistential plane slightly, and leaned reflectively against a moonbeam that slanted through the branches of an oak.

A second habited and cowed figure materialized beside him. "Perhaps so. But it does my age-wearied heart a strange good to see those familiar walls again casting their shadows over the field."

"A mockery, Brother Gregory. A mere shell that simulates the outlines of our beloved Priory. Think you that even the stones are of that good, gray granite that we built with? Nay! As this cursed simulacrum was a-building, I warped two hands into the solid, laid hold of a massy block, and by the saints, 'twas of such inconsequential weight I might have hurled it skyward with a finger. And within, is there aught which we may recognize? No chapel, no cloisters, no refectory—only long, geometrical rooms. And what devilries and unholy rites may not be centered about those strange mechanisms with which the rooms are filled?"

At the tirade, Brother Gregory sighed and thrust back his cowl to let the gracious moonbeams play on his tonsured head. "For an Untranslated One of some thousand years' standing," he said, "you exhibit a mulish ignorance, Brother James.

You would deny men all advancement. I remember well your curses when first we saw horseless carriages and flying machines."

"Idols!" James snapped. "Men worship them. Therefore are they evil."

"You are so good," Brother James," Gregory said, with the heaviest sarcasm. "So good, it is my constant wonderment that you have had to wait so long for Translation Upwards. Do you think that Dom Pennyhorse, the present incumbent of Selcor—a worthy man, with reverence for the past—would permit evil rites within his parish? You are a befuddled old anachronism, brother."

"That," said James, "is quite beyond sufferance. For you to speak thus of Translation, when it was your own self-indulgent pursuit of carnal pleasures that caused us to be bound here through the centuries!"

Brother Gregory said coldly: "It was not I who inveigled the daughter of Ronald the Wry-Neck into the kitchen garden, thus exposing the weak flesh of a brother to grievous temptation."

There was silence for a while, save for the whisper of a midnight breeze through the branches of the oak, and the muted call of a night-bird from the far woods.

Gregory extended a tentative hand and lightly touched the sleeve of James' habit. "The argument might proceed for yet another cen-

tury and bring us no nearer Translation. Besides it is not such unbearable penance, my brother. Were we not both lovers of the earth, of this fair countryside?"

James shrugged. Another silence. Then he fingered his gaunt white cheeks. "What shall we do, Brother Gregory? Shall we—appear to them?"

Gregory said: "I doubt whether common warp manifestation would be efficacious. As dusk fell tonight, I overheard a conversation between Dom Pennyhorse and a tall, young-featured man who has been concerned in the building of this simulacrum. The latter spoke in one of the dialects of the Americas; and it was mentioned that several of the men who will superintend the working of the machines within will also be from the United States—for a time at least. It is not prudent to haunt Americans in the normal fashion. Their attitude towards such matters is notoriously—unseemly."

"We could polter," suggested Brother James.

Gregory replaced his cowl. "Let us review the possibilities, then," he said, "remembering that our sub-etheric energy is limited."

They walked slowly together over the meadow towards the resuscitated gray walls of Selcor Prior. Blades of grass, positively charged by their passage, sprang suddenly upright, relaxed slowly into limpness as the charge leaked away.

They halted at the walls to adjust

their planes of incidence and degree of tenuity, passed inside.

The new Miracle Meal machines had had their first test run. The bearings on the dehydrator pumps were still warm as two black figures, who seemed to carry with them an air of vast and wistful loneliness, paced silently between rows of upright cylinders which shone dully in moonlight diffused through narrow windows.

"Here," said Gregory, the taller of the two, softly, "did we once walk the cloisters in evening meditation."

Brother James' broad features showed signs of unease. He felt more than mere nostalgia.

"Power—what are they using? Something upsets my bones. I am queasy, as when a thunderstorm is about to break. Yet there is no static."

Gregory stopped, looked at his hand. There was a faint blue aura at his fingertips. "Slight neutron escape," he said. "They have a small thorium-into-233 pile somewhere. It needs better shielding."

"You speak riddles."

Gregory said, with a little impatience: "You have the entire science section of the village library at your disposal at nightfall for the effort of a trifling polter, yet for centuries you have read nothing but the 'Lives of the Saints.' So, of course, I speak riddles—to you. You are even content to remain in ignorance of the basic principles of your own

structure and functioning, doing everything by traditional thought—rote and rule of thumb. But I am not so content; and of my knowledge, I can assure you that the radiation will not harm you unless you warp to solid and sit atop the pile when it is in full operation." Gregory smiled. "And then, dear brother, you would doubtless be so uncomfortable that you would dewarp before any harm could be done beyond the loss of a little energy that would be replaced in time. Let us proceed."

They went through three departments before Brother Gregory divined the integrated purpose of the vats, driers, conveyor-tubes, belts and containers.

"The end product, I'm sure, is a food of sorts," he said, "and by some quirk of fate, it is stored in approximately the position that was once occupied by our kitchen store—if my sense of orientation has not been bemused by these strange internal surroundings."

The test run of the assembly had produced a few score cans of Miracle Food. They were stacked on metal shelves which would tilt and gravity-feed them into the shaft leading up to the crating machine. Crated, they would go from there to the copter-loading bay on the roof.

Brother James reached out to pick up a loose can. His hand went through it twice.

"Polt, you dolt!" said Brother Gregory. "Or are you trying to be

miserly with your confounded energy? Here, let me do it."

The telekineticized can sprang into his solid hands. He turned it about, slightly increasing his infrared receptivity to read the label, since the storeroom was in darkness.

"Miracle Meal. Press Here."

He pressed, pressed again, and was closely examining the can when, after thirty seconds, the lid flipped off, narrowly missing his chin.

Born, and living, in more enlightened times, Brother Gregory's inquiring mind and insatiable appetite for facts would have made him a research worker. He did not drop the can. His hands were quite steady. He chuckled. He said: "Ingenious, very ingenious. See—the food is hot."

He warped his nose and back-palate into solid and delicately inhaled vapors. His eyes widened. He frowned, inhaled again. A beatific smile spread over his thin face.

"Brother James—warp your nose!"

The injunction, in other circumstances, might have been considered both impolite and unnecessary. Brother James was no beauty, and his big, blunt, snoutlike nose, which had been a flaring red in life, was the least prepossessing of his features.

But he warped it, and sniffed.

**M. M. SALES LEAFLET
NUMBER 14: It Will Sell By
Its Smell Alone.**

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Gregory said hesitantly: "Do you think, Brother James, that we might—"

James licked his lips, from side to side, slowly. "It would surely take a day's accumulation of energy to hold digestive and alimentary in solid for a sufficient period. But—"

"Don't be a miser," said Gregory. "There's a spoon beneath the lid. Get a can for yourself. And don't bother with digestive. Teeth, palate and throat are sufficient. It would not digest in any case. It remains virtually unchanged. But going down—ah, bliss!"

It went down. Two cans.

"Do you remember, brother," said James, in a weak, reminiscing voice, "what joy it was to eat and be strengthened. And now to eat is to be weakened."

Brother Gregory's voice was faint but happy. "Had there been food of this character available before our First Translation, I doubt whether other desires of the flesh would have appealed to me. But what was our daily fare set on the refectory table: peas; lentils; cabbage soup; hard, tasteless cheese. Year after year—ugh!"

"Health-giving foods, murmured Brother James, striving to be righteous even in his exhaustion. "Remember when we bribed the kitchen to get extra portions. Good trenchermen, we. Had we not died of the plague before our Priory became rich and powerful, then, by the

Faith, our present bodies would be of greater girth."

"Forms, not bodies," said Gregory, insisting even in *his* exhaustion on scientific exactitudes. "Variable fields, consisting of open lattices of energy foci resolvable into charged particles—and thus solid matter—when they absorb energy beyond a certain stage. In other words, my dear ignorant brother, when we polt. The foci themselves—or rather the spaces between them—act as a limited-capacity storage battery for the slow accretion of this energy from cosmic sources, which may be controlled and concentrated in the foci by certain thought-patterns."

Talking was an increasing effort in his energy-low state.

"When we polt," he went on slowly, "we take up heat, air cools. live people get cold shivers; ~~de~~-polt, give up heat, live people get clammy, cold-hot feeling; set up 'lectro-static field, live peoples' hair stan's on end"—his voice was trailing into deep, blurred inaudibility, like a mechanical phonograph running down, but James wasn't listening anyway—"an' then when we get Translated Up'ards by The Power that Is, all the energy goes back where it came from an' we jus' become thought. Thassall. Thought. Thought, thought, thought, thought—"

The phonograph ran down, stopped. There was silence in the transit storeroom of the Selcor Pri-

ory Factory branch of the Miracle Meal Corporation.

For a while.

Then—

"THOUGHT!"

The shout brought Brother James from his uneasy, uncontrolled repose at the nadir of an energy balance.

"What is it?" he grumbled. "I'm too weak to listen to any of your theorizing."

"Theorizing! I have it!"

"Conserve your energies, brother, else will you be too weak even to twist yourself from this place."

Both monks had permitted their forms to relax into a corner of the

storeroom, supine, replete in disrepletion.

Brother Gregory sat up with an effort.

"Listen, you attenuated conserve of very nothingness, I have a way to thwart, bemuse, mystify and irritate these crass philistines—and nothing so simple that a psychic investigator could put a thumb on us. What are we, Brother James?"

It was a rhetorical question, and Brother James had barely formulated his brief reply—"Ghosts"—before Brother Gregory, energized in a way beyond his own understanding by his own enthusiasm, went on: "Fields, in effect. Mere lines of force, in our un-polted state. What happens if we whirl? A star whirls. It has mass, rate of angular rotation, degree of compactness—therefore, gravity. Why? Because it has a field to start with. But we are our own fields. We need neither mass nor an excessive rate of rotation to achieve the same effect. Last week I grounded a high-flying wood-pigeon by whirling. It shot down to me through the air, and I'd have been buffeted by its pinions had I not stood aside. It hit the ground—not too heavily, by the grace of St. Barbara—recovered and flew away."

The great nose of Brother James glowed pinkly for a moment. "You fuddle and further weaken me by your prating. Get to your point, if you have such. And explain how we may do anything in our present unenergized state, beyond removing

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ourselves to a nexus point for recuperation."

Brother Gregory warped his own nose into solid in order to scratch its tip. He felt the need of this reversion to a life habit, which had once aided him in marshaling his thoughts.

"You think only of personal energy," he said scornfully. "We don't need that, to whirl. It is an accumulative process, yet we gain nothing, lose nothing. Matter is not the only thing we can warp. If you will only listen, you woof of unregenerate and forgotten flesh, I will try to explain without mathematics."

He talked.

After a while, Brother James' puzzled frown gave way to a faint smile. "Perhaps I understand," he said.

"Then forgive me for implying you were a moron," said Gregory. "Stand up, Brother James."

Calls on transatlantic tight-beam cost heavy. Anson Dewberry, Miracle Meal Overseas Division head, pointed this out to Mr. Stephen Samson three times during their conversation.

"Listen," said Samson at last, desperately, "I'll take no more delegation of authority. In my contract, it says I'm site adviser. That means I'm architect and negotiator, not detective or scientist or occultist. I offered to stay on here to supervise building because I happen to like the place. I like the pubs. I

like the people. I like the fishing. But it wasn't in my contract. And I'm now standing on that contract. Building is finished to schedule, plant installed—your tech men, incidentally, jetted out of here without waiting to catch snags after the first runoff—and now I'm through. The machines are running, the cans are coming off—and if the copters don't collect, that's for you and the London office to bat your brains out over. And the Lord forgive that mess of terminal propositions," he added in lower voice. Samson was a purist in the matter of grammar.

Anson Dewberry jerked his chair nearer the scanner in his New York office. His pink, round face loomed in Samson's screen like that of an avenging cherub.

"Don't you have no gendarmes around that place?" Mr. Dewberry was no purist, in moments of stress. "Get guards on, hire some militia, check employes. Ten thousand cans of M.M. don't just evaporate."

"They do," Samson replied sadly. "Maybe it's the climate. And for the seventh time, I tell you I've done all that. I've had men packed so tightly around the place that even an orphan neutron couldn't get by. This morning I had two men from Scotland Yard gumming around. They looked at the machines, followed the assembly through to the transit storeroom, examined the electrollocks and mauled their toe-caps trying to boot a dent in the door. Then the top one—that is, the one who only looked half-asleep—said,

"Mr. Samson, sir, do you think it's . . . uh . . . possible . . . that . . . uh . . . this machine of yours . . . uh . . . goes into reverse when your . . . uh . . . backs are turned and . . . uh . . . sucks the cans back again?"

Grating noises that might have been an incipient death rattle slid over the tight-beam from New York.

Samson nodded, a smirk of mock sympathy on his tanned, humor-wrinkled young face.

The noises ended with a gulp. The image of Dewberry thrust up a hesitant forefinger in interrogation. "Hey! Maybe there's something to that, at that—would it be possible?"

Samson groaned a little. "I wouldn't really know or overmuch care. But I have doubts. Meanwhile—"

"Right." Dewberry receded on the screen. "I'll jet a man over tonight. The best. From Research. Full powers. Hand over to him. Take some of your vacation. Design some more blamed mosques or tabernacles. Go fishing."

"A sensible suggestion," Samson said. "Just what I was about to do. It's a glorious afternoon here, sun a little misted, grass green, stream flowing cool and deep, fish lazing in the pools where the willow-shadows fall—"

The screen blanked. Dewberry was no purist, and no poet either. Samson made a schoolkid face. He switched off the fluor lamps that

supplemented the illumination from a narrow window in the supervisor's office—which, after studying the ground-plan of the original Selcor Priory, he had sited in the space that was occupied centuries before by the business sanctum of the Prior—got up from his desk and walked through a Norman archway into the sunlight.

He breathed the meadow-sweet air deeply, with appreciation.

The Rev. Malachi Pennyhorse was squatting with loose-jointed ease against the wall. Two fishing rods in brown canvas covers lay across his lap. He was studying one of the trout-flies nicked into the band of his ancient hat. His balding, brown pate was bared to the sun. He looked up.

"What fortune, my dear Stephen?"

"I convinced him at last. He's jetting a man over tonight. He told me to go fishing."

"Injunction unnecessary, I should imagine. Let's go. We shan't touch a trout with the sky as clear as this, but I have some float tackle for lazier sport." They set off across a field. "Are you running the plant today?"

Samson nodded his head towards a faint hum. "Quarter-speed. That will give one copter-load for the seventeen hundred hours collection, and leave enough over to go in the transit store for the night and provide Dewberry's man with some data. Or rather, lack of it."

"Where do you think it's going?"

"I've given up guessing."

Mr. Pennyhorse paused astride a stile and looked back at the gray bulk of the Priory. "I could guess who's responsible," he said, and chuckled.

"Uh? Who?"

Mr. Pennyhorse shook his head. "Leave that to your investigator."

A few moments later he murmured as if to himself: "What a haunt! Ingenious devils."

But when Stephen Samson looked at him inquiringly, he added: "But I can't guess where your cans have been put."

And he would say nothing more on the subject.

Who would deny that the pure of heart are often simple-minded? (The obverse of the proposition need not be argued.) And that cause-effect relations are sometimes divined more readily by the intuition of simpletons than the logic of scholars?

Brother Simon Simplex—Simple Simon to later legends—looked open-mouthed at the array of strange objects on the stone shelves of the kitchen storeroom. He was not surprised—his mouth was always open, even in sleep.

He took down one of the objects and examined it with mild curiosity. He shook it, turned it round, thrust a forefinger into a small depression. Something gave slightly, but there was no other aperture. He replaced it on the shelf.

When his fellow-kitchener returned, he would ask him the pur-

pose of the objects—if he could remember to do so. Simon's memory was poor. Each time the rota brought him onto kitchen duty for a week, he had to be instructed afresh in the business of serving meals in the refectory: platter so, napkin thus, spoon here, finger bowls half-filled, three water pitchers, one before the Prior, one in the center, one at the foot of the table—"and when you serve, tread softly and do not breathe down the necks of the brothers."

Even now could he hear the slight scrape of benches on stone as the monks, with bowed heads, freshly-washed hands in the sleeves of their habits, filed slowly into the refectory and took their seats at the long, oak table. And still his fellow-kitchener had not returned from the errand. Food was prepared—dared he begin to serve alone?

It was a great problem for Simon, brother in the small House of Selcor, otherwise Selcor Priory, poor cell-relation to the rich monastery of the Cluniac Order at Battle, in the year 1139, A.D.

Steam pressure in the triggered can of Miracle Meal did its work. The lid flipped. The aroma issued.

Simon's mouth nearly shut as he sniffed.

The calm and unquestioning acceptance of the impossible is another concomitant of simplicity and purity of heart. To the good and simple Simon the rising of the sun each morning and the singing of

birds were recurrent miracles. Compared with these, a laboratory miracle of the year 2143 A.D. was as nothing.

Here was a new style of platter, filled with hot food, ready to serve. Wiser minds than his had undoubtedly arranged matters. His fellow-kitcheners, knowing the task was thus simplified, had left him to serve alone.

He had merely to remove the covers from these platters and carry them into the refectory. To remove the covers—cause—effect—the intuition of a simple mind.

Simon carried fourteen of the platters to the kitchen table, pressed buttons and waited.

He was gravely tempted to sample the food himself, but all-inclusive Benedictine rules forbade kitcheners to eat until their brothers had been served.

He carried a loaded tray into the refectory where the monks sat in patient silence except for the lone voice of the Reader who stood at a raised lectern and intoned from the "Lives of the Saints".

Pride that he had been thought fit to carry out the duty alone made Simon less clumsy than usual. He served the Prior, Dom Holland, first, almost deftly; then the other brothers, in two trips to the kitchen.

A spicy, rich, titillating fragrance filled the refectory. The intoning of the "Lives of the Saints" faltered for a moment as the mouth of the Reader filled with saliva, then he grimly continued.

At Dom Holland's signal, the monks ate.

The Prior spooned the last drops of gravy into his mouth. He sat back. A murmur arose. He raised a hand. The monks quietened. The Reader closed his book.

Dom Holland was a man of faith; but he did not accept miracles or even the smallest departures from routine existence without questioning. He had sternly debated with himself whether he should question the new platters and the new food before or after eating. The aroma decided him. He ate first.

Now he got up, beckoned to a senior monk to follow him, and paced with unhurried calmness to the kitchen.

Simon had succumbed. He was halfway through his second tin.

He stood up, licking his fingers.

"Whence comes this food, my son?" asked Dom Holland, in sonorous Latin.

Simon's mouth opened wider. His knowledge of the tongue was confined to prayers.

Impatiently the Prior repeated the question in the English dialect of the district.

Simon pointed, and led them to the storeroom.

"I looked, and it was here," he said simply. The words were to become famed.

His fellow-kitcheners were sought—he was found dozing in a warm corner of the kitchen garden—and questioned. He shook his head.

The provisioner rather reluctantly disclaimed credit.

Dom Holland thought deeply, then gave instructions for a general assembly. The plastic "platters" and the hygiplast spoons were carefully examined. There were murmurs of wonderment at the workmanship. The discussion lasted two hours.

Simon's only contribution was to repeat with pathetic insistence: "I looked and it was there."

He realized dimly that he had become a person of some importance.

His face became a mask of puzzlement when the Prior summed up:

"Our simple but blessed brother, Simon Simplex, it seems to me, has become an instrument or vessel of some thaumaturgical manifestation. It would be wise, however, to await further demonstration before the matter is referred to higher authorities."

The storeroom was sealed and two monks were deputed as nightguards.

Even with the possibility of a miracle on his hands, Dom Holland was not prepared to abrogate the Benedictine rule of only one main meal a day. The storeroom wasn't opened until early afternoon of the following day.

It was opened by Simon, in the presence of the Prior, a scribe, the provisioner, and two senior monks.

Released, a pile of Miracle Meal cans toppled forward like a crumbling cliff, slithering and clattering in noisy profusion around Simon's

legs, sliding over the floor of the kitchen.

Simon didn't move. He was either too surprised or cunningly aware of the effectiveness of the scene. He stood calf-deep in cans, pointed at the jumbled stack inside the storeroom, sloping up nearly to the stone roof, and said his little piece:

"I look, and it is here."

"Kneel, my sons," said Dom Holland gravely, and knelt.

Manna.

And at a time when the Priory was hard-pressed to maintain even its own low standard of subsistence, without helping the scores of dispossessed refugees encamped in wattle shacks near its protecting walls.

The countryside was scourged by a combination of civil and foreign war. Stephen of Normandy against Matilda of Anjou for the British throne. Neither could control their own followers. When the Flemish mercenaries of King Stephen were not chasing Queen Matilda's Angevins back over the borders of Wiltshire, they were plundering the lands and possessions of nominal supporters of Stephen. The Angevins and the barons who supported Matilda's cause quite impartially did the same, then pillaged each other's property, castle against castle, baron against baron.

It was anarchy and free-for-all—but nothing for the ignored serfs, bondmen, villeins and general peasantry, who fled from stricken

homes and roamed the countryside in bands of starving thousands. Some built shacks in the inviolate shadow of churches and monasteries.

Selcor Priory had its quota of barefoot, raggedly men, women and children—twelfth century Displaced Persons.

They were a headache to the Prior, kindly Dom Holland—until Simple Simon's Miracle.

There were seventy recipients of the first hand-out of Miracle Meal cans from the small door in the Priory's walled kitchen garden.

The next day there were three hundred, and the day after that, four thousand. Good news doesn't need radio to get around fast.

Fourteen monks worked eight-hour shifts for twenty-four hours, hauling stocks from the capacious storeroom, pressing buttons, handing out steaming platters to orderly lines of refugees.

Two monks, shifting the last few cans from the store, were suddenly buried almost to their necks by the arrival of a fresh consignment, which piled up out of thin air.

Providence, it seemed, did not depend solely upon the intervention of Simon Simplex. The Priory itself and all its inhabitants were evidently blessed.

The Abbot of Battle, Dom Holland's superior, a man of great girth and great learning visited the Priory. He confirmed the miracle—by studying the label on the can.

After several hours' work in the

Prior's office, he announced to Dom Holland:

"The script presented the greatest difficulty. It is an extreme simplification of letter-forms at present in use by Anglo-Saxon scholars. The pertinent text is a corruption—if I may be pardoned the use of such a term in the circumstances—of the Latin '*miraculum*' compounded with the word '*maél*' from our own barbarous tongue—so, clearly, Miracle Meal!"

Dom Holland murmured his awe of this learning.

The Abbot added, half to himself: "Although why the nature of the manifestation should be thus advertised in repetitive engraving, when it is self-evident—" He shrugged. "The ways of Providence are passing strange."

Brother Gregory, reclining in the starlight near his favorite oak, said:

"My only regret is that we cannot see the effect of our gift—the theoretical impact of a modern product—usually a weapon—on past ages is a well-tryed topic of discussion and speculation among historians, scientists, economists and writers of fantasy."

Brother James, hunched in vague adumbration on a wall behind, said: "You are none of those things, else might you explain why it is that, if these cans have reached the period for which, according to your abstruse calculations, they were destined—an age in which we were both alive—we cannot remember

such an event, or why it is not recorded in histories of the period."

"It was a time of anarchy, dear brother. Many records were destroyed. And as for our memories—well, great paradoxes of time are involved. One might as profitably ask how many angels may dance on the point of a pin. Now if you should wish to know how many atoms might be accommodated in a like position—"

Brother Gregory was adroit at changing the subject. He didn't wish to speculate aloud until he'd figured out all the paradox possibilities. He'd already discarded an infinity of time-streams as intellectually unsatisfying, and was toying with the concept of recurrent worlds—

"Dom Pennyhorse has guessed that it is our doing."

"What's that?"

Brother James repeated the information snugly.

Gregory said slowly: "Well, he is not—unsympathetic—to us."

"Assuredly, brother, we have naught to fear from him, nor from the pleasant young man with whom he goes fishing. But this young man was today in consultation with his superior, and an investigator is being sent from America."

"Psychic investigator, eh? Phooey. We'll tie him in knots," said Gregory complacently.

"I assume," said Brother James, with a touch of self-righteousness, "that these vulgar colloquialisms to which you sometimes have recourse

are another result of your nocturnal reading. They offend my ear. 'Phooey,' indeed— No, this investigator is one with whom you will undoubtedly find an affinity. I gather that he is from a laboratory—a scientist of sorts."

Brother Gregory sat up and rubbed his tonsure thoughtfully. "That," he admitted, "is different." There was a curious mixture of alarm and eagerness in his voice. "There are means of detecting the field we employ."

An elementary electroscope was one of the means. An ionization indicator and a thermometer were others. They were all bolted firmly on a bench just inside the storeroom. Wires led from them under the door to a jury-rigged panel outside.

Sandy-haired Sidney Meredith of M.M. Research sat in front of the panel on a folding stool, watching dials with intense blue eyes, chin propped in hands.

Guards had been cleared from the factory. He was alone, on the advice of Mr. Pennyhorse, who had told him: "If, as I suspect, it's the work of two of my . . . uh . . . flock . . . two very ancient parishioners . . . they are more likely to play their tricks in the absence of a crowd."

"I get it," Meredith had said. "Should be interesting."

It was.

He poured coffee from a thermos without taking his eyes from the panel. The thermometer reading was dropping slowly. Ionization

was rising. From inside the store came the faint rasp of moving objects.

Meredith smiled, sighted a thumb-size camera, recorded the panel readings. "This," he said softly, "will make a top feature in the *Journal*: 'The most intensive psychic and poltergeist phenomena ever recorded. M.M.'s top tech trouble-shooter spikes spooks.'"

There was a faint snap beyond the door. Dials swooped back to zero. Meredith quit smiling and daydreaming.

"Hey—play fair!" he called.

The whisper of a laugh answered him, and a soft, hollow whine, as of a wind cycloning into outer space.

He grabbed the door, pulled. It resisted. It was like trying to break a vacuum. He knelt, lit a cigarette, held it near the bottom of the nearly flush-fitting door. A thin streamer of smoke curled down and was drawn swiftly through the barely-perceptible crack.

The soft whine continued for a few seconds, began to die away.

Meredith yanked at the door again. It gave, to a slight ingush of air. He thrust his foot in the opening, said calmly into the empty blackness: "When you fellers have quite finished—I'm coming in. Don't go away. Let's talk."

He slipped inside, closed the door, stood silent for a moment. He sniffed. Ozone. His scalp prickled. He scratched his head, felt the hairs standing upright. And it was cold.

He said: "Right. No point in

playing dumb or covering-up, boys." He felt curiously ashamed of the platitudes as he uttered them. "I must apologize for breaking in," he added—and meant it. "But this has got to finish. And if you're not willing to—co-operate—I think I know now how to finish it."

Another whisper of a laugh. And two words, faint, gently mocking: "Do you?"

Meredith strained his eyes against the darkness. He saw only the nerve-patterns in his own eyes. He shrugged.

"If you won't play—" He switched on a blaze of fluor lamps. The long steel shelves were empty. There was only one can of Miracle Meal left in the store.

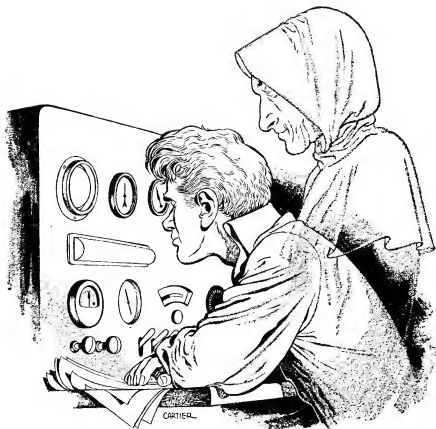
He felt it before he saw it. It dropped on his head, clattered to the plastocrete floor. When he'd retrieved his breath, he kicked it savagely to the far end of the store and turned to his instruments.

The main input lead had been pulled away. The terminal had been loosened first.

He unclamped a wide-angle infrared camera, waited impatiently for the developprinter to act, pulled out the print.

And laughed. It wasn't a good line-caricature of himself, but it was recognizable, chiefly by the shock of unruly hair.

The lines were slightly blurred, as though written by a needlepoint of light directly on the film. There was a jumble of writing over and under it.



"Old English, I suppose," he murmured. He looked closer. The writing above the caricature was a de Sitter version of the Riemann-Christoffel tensor, followed in crabbed but readable modern English by the words: "Why reverse the sign? Do we act like anti-particles?"

Underneath the drawing was an energy tensor and a comment: "You will notice that magnetic momenta

contribute a negative density and pressure."

A string of symbols followed, ending with an equals sign and a query mark. And another comment: "You'll need to take time out to balance this one."

Meredith read the symbols, then sat down heavily on the edge of the instrument bench and groaned. Time out. But Time was already out, and there was neither matter

nor radiation in a de Sitter universe.

Unless—

He pulled out a notebook, started to scribble.

An hour later Mr. Pennyhorse and Stephen Samson came in.

Mr. Pennyhorse said: "My dear young fellow, we were quite concerned. We thought—"

He stopped. Meredith's blue eyes were slightly out of focus. There were beads of sweat on his brow despite the coolness of the store-room. Leaves from his notebook and cigarette stubs littered the floor around his feet.

He jumped like a pricked frog when the vicar gently tapped his shoulder, and uttered a vehement cuss-word that startled even the broad-minded cleric.

Samson tutted.

Meredith muttered: "Sorry sir. But I think I nearly had it."

"What, my son?"

Meredith looked like a ruffled-haired schoolboy. His eyes came back into focus. "A crossword puzzle clue," he said. "Set by a spook with a super-I.Q. Two quite irreconcilable systems of mathematics lumped together, the signs in an extended energy tensor reversed, merry hell played with a temporal factor—and yet it was beginning to make sense."

He smiled wryly. "A ghost who unscrews terminals before he breaks connections and who can make my brain boil is a ghost worth meeting."

Mr. Pennyhorse eased his pince-nez. "Uh . . . yes. Now, don't you think it's time you came to bed? It's four a.m. My housekeeper has made up a comfortable place on the divan in the sitting room." He took Meredith's arm and steered him from the store.

As they walked across the dewy meadows towards the vicarage, with the first pale streaks of dawn showing in the sky, Samson said: "How about the cans?"

"Time," replied Meredith vaguely, "will tell."

"And the guards?"

"Pay them off. Send them away. Keep the plant rolling. Fill the transit store tonight. And I want a freighter copter to take me to London University this afternoon."

Back in the transit store, the discarded leaves from Meredith's notebook fluttered gently upwards in the still air and disappeared.

Brother James said: "He is alone again."

They looked down on the sandy head of Sidney Meredith from the vantage point of a dehydrating tower.

"So I perceive. And I fear this may be our last uh . . . consignment to our erstwhile brothers," said Gregory thoughtfully.

"Why?"

"You will see. In giving him the clue to what we were doing, I gave him the clue to what we are, essentially."

They drifted down towards the transit store.

"After you, Brother James," said Brother Gregory with excessive politeness.

James adjusted his plane of incidence, started through the wall, and—

Shot backwards with a voiceless scream of agony.

Brother Gregory laughed. "I'm sorry. But that's why it will be our last consignment. Heterodyning is painful. He is a very intelligent fellow. The next time, he will take care to screen both his ultra-short generator and controls so that I cannot touch them."

Brother James recovered. "You . . . you use me as a confounded guinea pig! By the saints, you appear to have more sympathy with the man than with me!"

"Not more sympathy, my beloved brother, but certainly much more in common," Brother Gregory replied frankly. "Wait."

He drifted behind Meredith's back and poltered the tip of one finger to flick a lightly-soldered wire from a terminal behind a switch. Meredith felt his scalp tingle. A pilot light on his panel blinked out.

Meredith got up from his stool, stretched lazily, grinned into the empty air. He said aloud: "Right. Help yourselves. But I warn you—once you're in, you don't come out until you agree to talk. I have a duplicate set and a built-in circuit-tester. The only way you can spike

them is by busting tubes. And I've a hunch you wouldn't do that."

"No," James muttered. "You wouldn't. Let us go."

"No," Gregory answered. "Inside quickly—and whirl. Afterwards I shall speak with him. He is a youth of acute sensibilities and gentleness, whose word is his bond."

Gregory urged his fellow-monk to the wall. They passed within.

Meredith heard nothing, until a faint whine began in the store. He waited until it died away, then knocked on the door. It seemed, crazily, the correct thing to do.

He went into the darkness. "You there?"

A low and pleasant voice, directionless: "Yes. Why didn't you switch on your duplicate generator?"

Meredith breathed deep. "I didn't think it would be necessary. I feel we understand each other. My name is Sidney Meredith."

"Mine is Gregory of Ramsbury."

"And your—friend?"

"James Brasenose. I may say that he disapproves highly of this conversation."

"I can understand that. It is unusual. But then, you're a very unusual . . . um—"

"'Ghost' is the common term, Mr. Meredith. Rather inadequate, I think, for supranormal phenomena which are, nevertheless, subject to known laws. Most Untranslated spirits remain quite ignorant of their own powers before final Translation. It was only by intensive reading and thought that I deter-

mined the principles and potentialities of my construction."

"Anti-particles?"

"According to de Sitter," said Brother Gregory, "that is what we should be. But we are not mere mathematical expressions. I prefer the term 'energy foci'. From a perusal of the notes you left behind yesterday morning—and, of course, from your use of ultra-short waves tonight—it seems you struck the correct train of deduction immediately. Incidentally, where did you obtain the apparatus at such short notice?"

"London University."

Brother Gregory sighed. "I should like to visit their laboratories. But we are bound to this area by a form of moral compulsion that I cannot define or overcome. Only vicariously, through the achievements of others, may I experience the thrill of research."

"You don't do so badly," Meredith said. He was mildly surprised that he felt quite so sane and at ease, except for the darkness. "Would you mind if we had a light?"

"I must be semipolited—or warped—to speak with you. It's not a pleasant sight—floating lungs, larynx, palate, tongue and lips. I'd feel uncomfortable for you. We might appear for you later, if you wish."

"Right. But keep talking. Give me the how and the why. I want this for my professional journal."

"Will you see that the issue con-

taining your paper is placed in the local library?"

"Surely," Meredith said. "Two copies."

"Brother James is not interested. Brother James, will you kindly stop whispering nonsense and remove yourself to a nexus point for a while. I intend to converse with Mr. Meredith. Thank you."

The voice of Brother Gregory came nearer, took on a slightly professorial tone. "Any massive and rotating body assumes the qualities of magnetism—or rather, gravitic, one-way flux—by virtue of its rotation, and the two quantities of magnetic momentum and angular momentum are always proportional to one another, as you doubtless know."

Meredith smiled inwardly. A lecture on elementary physics from a ghost. Well—maybe not so elementary. He remembered the figures that he'd sweated over. But he could almost envisage the voice of Brother Gregory emanating from a black-gowned instructor in front of a classroom board.

"Take a star," the voice continued. "Say 78 Virginis—from whose flaming promontories the effect was first deduced a hundred years ago—and put her against a counter-whirling star of similar mass. What happens? Energy warp, of the kind we use every time we polt. But something else happens—did you infer it from my incomplete expression?"

Meredith grinned. He said: "Yes. Temporal warp."

"Oh." There was a trace of disappointment in the voice.

Meredith added quickly: "But it certainly gave me a headache figuring it out."

Gregory was evidently mollified by the admission. "Solids through time," he went on. "Some weeks ago, calculating that my inherent field was as great in certain respects as that of 78 Virginis, I whirled against a longitudinal line, and forced a stone back a few days—the nearest I could get to laboratory confirmation. Knowing there would be a logical extension of the effect if I whirled against a field as strong as my own, I persuaded Brother James to co-operate with me—and you know the result."

"How far back?"

"According to my mathematics, the Twelfth Century, at a time when we were—alive. I would appreciate your views on the paradoxes involved."

Meredith said: "Certainly. Let's go over your math together first. If it fits in with what I've already figured, perhaps I'll have a suggestion to make. You appreciate, of course, that I can't let you have any more cans?"

"Quite. I must congratulate your company on manufacturing a most delicious comestible. If you will hand me the roll of infrared film from your camera, I can make my calculations visible to you on the emulsion in the darkness. Thank

you. It is a pity," Gregory murmured, "that we could not see with our own eyes what disposal they made of your product in the days of our Priory."

When, on the morning of a certain bright summer day in 1139, the daily consignment of Miracle Meal failed to arrive at Selcor Priory, thousands of disappointed refugees went hungry.

The Prior, Dom Holland—who, fortunately for his sanity or at least his peace of mind, was not in a position to separate cause from effect—attributed the failure of supply to the lamentable departure from grace and moral standards of two of the monks.

By disgracing themselves in the kitchen garden with a female refugee, he said, they had obviously rendered the Priory unfit to receive any further miraculous bounty.

The abject monks, Brother Gregory and Brother James, were severely chastised and warned in drastic theological terms that it would probably be many centuries before they had sufficiently expiated their sins to attain blessedness.

On the morning of another bright summer day, the Rev. Malachi Penryhorse and Stephen Samson were waiting for Sidney Meredith in the vicar's comfortable study.

Meredith came in, sank into a century-old leather easy-chair, stretched his shoes, damp with dew from the meadow grass, towards the

flames. He accepted a glass of whiskey gratefully, sipped it.

He said: "The cans are there. And from now on, they stay in the transit store until the copters collect."

There was an odd note of regret in his voice.

Samson said: "Fine. Now maybe you'll tell us what happened yesterday."

Mr. Pennyhorse said: "You . . . uh . . . liked my parishioners, then?"

Meredith combined a smile and a sigh. "I surely did. That Brother Gregory had the most intense and dispassionate intellectual curiosity of anyone I ever met. He nearly grounded me on some aspects of energy mathematics. I could have used him in my department. He'd have made a great research man. Brother James wasn't a bad old guy, either. They appeared for me—"

"How did you get rid of them?" Samson interrupted.

"They got rid of themselves. Gregory told me how, by whirling against each other with gravitic fields cutting, they drew the cans into a vortex of negated time that threw them way back to the twelfth century. After we'd been through his math, I suggested they whirl together."

"What—and throw the cans ahead?"

"No. Themselves, in a sense, since they precipitated a future, hoped-for state. Gregory had an idea what would happen. So did I. He'd

only discovered the effect recently. Curiosity got the better of him. He had to try it out straight away. They whirled together. The fields reinforced, instead of negated. Enough in-going energy was generated to whoop their own charges well above capacity and equilibrium. They just—went. As Gregory would put it—they were Translated."

"Upwards, I trust," said Mr. Pennyhorse gently.

"Amen to that," said Samson.

Upwards—

Pure thought, unbound, Earth-rid, roaming free amid the wild bright stars—

Thought to Thought, over galactic vastnesses, wordless, yet swift and clear, before egos faded—

"Why didn't I think of this before? We might have Translated ourselves centuries ago."

"But then we would never have tasted Miracle Meal."

"That is a consideration," agreed the Thought that had been Brother Gregory.

"Remember our third can?" came the Thought that had been Brother James.

But there was no reply. Something of far greater urgency and interest than memories of Miracle Meal had occurred to the Thought that had been Brother Gregory.

With eager curiosity, it was spiraling down into the heart of a star to observe the integration of helium at first hand.

THE END

THE LITTLE BLUE CELLS

BY J. J. COUPLING

The most acute problem in the design of a robot, a thinking machine, or any of the self-serving devices of science-fiction is memory. We can make the robot's body, its sensory equipment, its muscles and limbs. But thinking requires association of remembered data; memory is the essential key. So we present the Little Blue Cells!

Most of the robots I have met have been either man-sized androids with positronic brains to match, or huge block-square piles of assorted electrical junk. The small, self-portable models I admire from a distance, but I feel no temptation to speculate about their inner secrets. The workings of the big thinking machines have intrigued me, however. It used to be that I didn't know whether to believe in them or not. Now, the Bell Laboratories relay computer, the various IBM machines and the Eniac are actually grinding through computations in a manner at once superhuman and subhuman. With the other readers of Astounding I've had a sort of conducted tour through the brain cases of these monsters in "Modern Computing Devices," by E. L. Locke. I'm pretty much convinced. It's beginning to look as if we'll

know the first robot well long before he's born.

Perhaps some readers of science fiction can look back to the old, unenlightened days and remember a prophetic story called, I believe, "The Thinking Machine." The inventor of that epoch had first to devise an "electronic language" before he could build his electrical cogitator. The modern thinking machine of the digital computer type comes equipped with a special electronic alphabet and vocabulary if not with a complete language. The alphabet has the characters *off* and *on*, or 0 and 1, the digits of the binary system of enumeration, and words must certainly be of the form 1001-110—and so on. We may take it from Mr. Locke that somewhere in the works of our thinking machine information will be transformed into such a series of binary digits,

whether it be fed in on paper tape or picked up by an electronic eye or ear. The machine's most abstruse thought, or its fondest recollection—if such machines eventually come to have emotions—will be stored away as off's and on's in the multitudinous blue cells of the device's memory.

I'm sure that I'm right in describing the memory cells of the machine as multitudinous and little—that is, if it's a machine of any capabilities at all. To describe them as blue is perhaps guessing against considerable odds, but there are reasons even for this seemingly unlikely prognostication.

The multitudinous part is, I think, obvious. The more memory cells the machine has, the more the machine can store away—learn—the more tables and material it can have on hand, and the more complicated routines it can remember and follow. The human brain, for instance, has around ten billion nerve cells. It may be that each of these can do more than store a single binary digit—a single off or on, or 0 or 1. Even if each nerve cell stored only one digit, that would still make the brain a lot bigger than any computing machine contemplated at present. Present plans for machines actually to be built call for one hundred thousand or so binary digits, or, for only a hundred-thousandth as many storage cells as the brain has nerve cells. Mathematicians like to talk about machines to store one to ten million binary digits, which would still fall short of the least estimated size of

the brain by a factor of one thousand to ten thousand. But, if one hundred thousand and ten million are both small numbers as far as the human brain is concerned, they're big numbers when it comes to building a machine, as we can readily see. It is because of the size of such numbers that we know that the memory cells of our thinking machine will have to be small, and, we might add, cheap.

For instance, some present-day computers use relays as memory cells. Now, a good and reliable relay, one good enough to avoid frequent failure even when many thousands of relays are used, costs perhaps two dollars. If we wanted a million cells, the cost of the relays would thus be two million dollars, and this is an unpleasant thought to start with. Further, one would probably mount about a thousand relays on one relay rack, and so there would be a thousand relay racks. These could perhaps be packed into a space of about six thousand square feet—around eighty by eighty feet. Then, there would have to be quite a lot of associated equipment, for more relays would be needed to make a connection to a given memory cell and to utilize the information in it. This would increase the cost and the space occupied a good deal. The thing isn't physically impossible, but it seems an unpromising start if we wish to advance further, toward the at least ten thousand-fold greater complexity of the human brain.

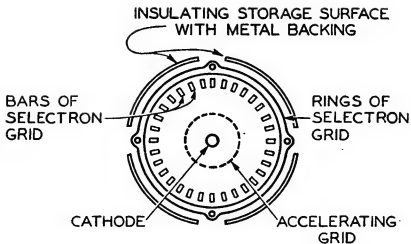


Figure 1. A cross-section view of the selectron. Information is stored as a voltage on the inner side of the insulating storage surface. The voltage is established by electron streams flowing through the "windows" formed by the bars and rings of the selectron grid. Such electron streams are also used in reading the information off.

Fortunately, at just the time it was needed, something better than the relay has come along. That something, the possessor of the little blue cells, is the *selectron*. It is a vacuum tube which can serve in the place of several thousand relays. It promises to be reliable, small and, eventually, at least, cheaper than relays, and in addition it is very much faster—perhaps a thousand-fold. The selectron was invented by an RCA engineer, Dr. Jan A. Rajchman—pronounced *Rikeman*—for the purpose of making an improved computer, and so its appearance at just the right time is, after all, no

accident. Instead, it is a tribute to Dr. Rajchman's great inventive ability. Lots of people who worked on computers knew what the problem was, but only he thought of the selectron.

You might wonder how to go about inventing just what is needed, and if Dr. Rajchman's career can cast any light on this, it's certainly worth looking into. Did he, for instance, think about computers from his earliest technical infancy? The answer is that he certainly didn't. I have a copy of his doctoral thesis, "*Le Courant Résiduel dans Les Multiplicateurs D'Électrons*

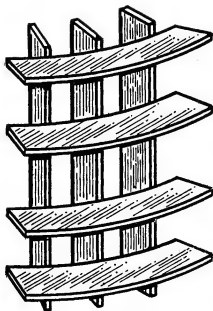


Figure 2. A perspective view showing the arrangement of bars and rings forming the selectron grid and its windows.

Electrostatiques," which tells me that he was born in London in 1911, that he took his degree at Le École Polytechnique Fédérale, at Zurich and thereafter did research on a radically new type of electrically focused photo-multiplier—see "Universes to Order," in *Astounding* for February, 1944. I am not sure how many different problems he has worked on since, but during the war he did do some very high-powered theoretical work on the betatron, as well as some experimental work on the same

device. It would seem that the best preparation for inventing is just to become thoroughly competent in things allied to the field in which something new is needed.

What was needed in connection with computers was, as we have said, a memory cell, or, rather, lots of them. What do these cells have to do? First of all, one must be able to locate a given cell in the memory, so as to put information into it or take information out. Then, one must be able to put into the cell the equivalent of a 0 or a 1. One must have this stay there indefinitely, until it is deliberately changed. Finally, one must be able to read off what is stored in the cell; one must be able to tell whether it signifies 0 or 1 *without altering what is in the cell*. The selectron has these features.

You might be interested in some of the earlier suggestions for using an electron tube as a memory in a computing machine. The electron beam of a cathode ray tube sounds like just the thing for locating a piece of information, for instance. One has merely to deflect it the right amount horizontally and vertically to reach a given spot on the screen of the tube. One wishes, however, to store a particular piece of information in a particular place and then to find that same place again and retrieve that same piece of information. This would mean reproducing the exact voltages used on the deflecting plates when the information was stored, and that is

by no means easy. Further, if the accelerating voltage applied to the tube changes, the deflecting voltage needed to deflect the beam to a given place changes, and this adds difficulty. When we realize further that our memory simply must not make mistakes, we see that there are real objections to locating and relocating a given spot by simply deflecting an electron beam to it. The selectron has a radically different means for getting electrons to a selected spot—the selectron grid.

The features of the selectron which Dr. Rajchman holds in his hand—page 163—are illustrated simply in Figure 1. There is a central cathode and around it a concentric accelerating grid. When this grid is made positive with respect to the cathode, a stream of electrons floods the entire selectron grid, the next element beyond the accelerating grid. The selectron grid, is made up of a number of thin bars located in a circular array, pointing radially outward, and a number of thin rings, spaced the same distance apart as are the bars. Figure 2 shows a portion of the selectron grid formed by the rings and bars. The rings and bars together form a number of little rectangular openings or windows.

Now, in operation each bar and ring of the selectron grid is held either several hundred volts positive with respect to the cathode, or else a little negative with respect to the cathode. After a definite pattern of voltages has been established on the

selectron grid, the accelerating grid is made positive and the selectron grid is flooded with electrons. What happens? Let us consider first the bars of the selectron grid. Figure 3 tells the story. If two neighboring bars are negative, the approaching electrons are simply repelled and turned back. If an electron enters the space between a positive bar and a negative bar, it is so strongly attracted toward the positive bar that it strikes it and is lost. Only if the bars on *both sides* of the space which the electron enters are positive does the electron get through. At the rings, the story is the same; an electron can pass between two rings only if both are positive; it is stopped if either one or both are negative. Thus we conclude that electrons can pass through a little window formed by two bars and two rings only if *both* bars and *both* rings are positive. If both bars and both rings forming a window are



Figure 3. Electrons can pass between two bars or rings only if both are positive. If both are negative, the electron is turned back. If one is negative, the electron is deflected and lost on the positive bar or ring.

held positive, the window is open; if one or more of the bars or rings are negative, the window is closed. Thus, we have a means for letting electrons through one window at a time.

In the early model selectrons there were sixty-four apertures between bars around the tube, and sixty-four apertures lengthwise, giving four thousand ninety-six windows in all, and any one of these could be selected for the passage of electrons by applying proper voltages to the bars and rings. Does this mean that we must have one hundred twenty-eight leads into the tube for this alone, one for each bar and one for each ring? The tube would certainly work if it had one hundred twenty-eight leads to the selectron grid, but Dr. Rajchman's ingenuity has cut this down instead to thirty-two, a saving by a factor of four. How is this done? The table of Figure 4 tells the story. Here we have in the top row the numbers of the bars, in order, sixty-four in all. These bars are connected to two sets of eight leads. The second and third rows show to which lead of a given set a bar is connected. Thus, Bar 1 is connected to Lead 1 of Set I. Bar 2 is connected to Lead 1 of Set II, while Bar 64 is connected to Lead 8 of Set II. To save space, some of the bars have been omitted from the table.

You will observe that if we make Lead 7 of Set I positive, and all the rest of the leads of Set I negative, Bars 13, 29, 45 and 61 will be

positive. Then, if we make Lead 2 of Set II positive and all the other leads of Set II negative, Bars 4, 8, 12 and 16 will be positive. All the bars which do not appear in either of the above listings will be negative. Now, the only adjacent bars listed are 12 and 13, which have been written in italics. Hence, when Lead 7 of Set I and Lead 2 of Set II are made positive and all the other leads negative, electrons can pass between the two adjacent positive bars 12 and 13, but not between any other bars.* Thus, by selecting one lead from Set I and one lead from Set II, we can select any of the sixty-four spaces between bars.

The thoughtful reader will have noticed, by the way, that there are only sixty-three spaces between sixty-four bars. This, however, omits the space out to infinity from Bar 1 and back from infinity to Bar 64. We can in effect shorten this space by adding an extra bar beyond the sixty-fourth and connecting it to Bar 1.

The same sort of connection used with the bars is made to the rings, so that by selecting and making positive one lead each in two sets of eight leads we can select any of the sixty-four spaces between rings. Thus, in the end we have four sets of eight leads each, two sets for the bars and two for the rings. We make positive one wire in each set at a time. The number of possible combinations we can get this way is four thousand ninety-six, and each allows electrons to go through

BARS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	60	61	62	63	64
LEADS SET I	1		2		3		4		5		6		7		8		1		2		7		8	
LEADS SET II		1		2		1		2		1		2		1		2		3		8		7		8

Figure 4. The sixty-four bars are connected to two sets of eight leads in the fashion shown. By making one lead of each set positive and the others negative, it is possible to make any pair of adjacent bars positive and at the same time have no other adjacent pair positive.

just one window out of the four thousand ninety-six formed by the bars and rings of the selectron grid. The action is entirely positive. A given window is physically located in a given place. Small fluctuations in the voltages applied to the bars and rings will not interfere with the desired operation. This is a lot different from trying to locate a given spot by waving an electron beam around.

The selectron grid and its action are, of course, only a part of the mysteries of the selectron. They provide a means for directing a stream of electrons through one of several thousand little apertures at will. But, how can this stream of electrons be used in storing a signal and then in reading it off again? Part of the answer is not new. For some time electronic experts have been thinking of storing a signal on an insulating surface as an electric charge deposited on the surface by means of an electron stream. Thus, by putting electrons on a sheet of mica, for instance, we can make the surface negative, and by taking them

off we can make it positive. It is easy enough to do either of these things, as we shall see in a moment.

There are two very serious difficulties with such a scheme, however. First, how shall we keep the positive or negative charge on the insulating surface indefinitely? It will inevitably tend to leak off. Second, how can we determine whether the surface is charged positively or negatively without disturbing the charge? The logical exploring tool is an electron beam, but won't the beam drain the charge off in the very act of exploration? Both of these difficulties are overcome in the selectron. To understand how, we must know a little about secondary emission.

Beyond the accelerating and selectron grids of the selectron, as shown in Figure 1, there is a sheet of mica indicated as "storage surface." This has a conducting backing. We are interested in what happens when electrons pass through an open window in the selectron grid—one made up of four positive bars and rings—and strike the mica. The essential ingredients of the situation are illustrated in the

simplified drawing of Figure 5. Here the accelerating grid and the selectron grid are lumped together and shown as positive with respect to the cathode. Electrons are accelerated from the cathode, pass through the accelerating grid and the open window of the selectron grid, and shoot toward the mica storage surface. What happens? That depends on the potential of the storage surface with respect to the cathode.

In Figure 6 the current reaching the part of the storage surface behind an open window is plotted vs. the potential of that part of the storage surface with respect to the cathode. Potential is negative with respect to the cathode to the left of the vertical axis and positive with respect to the cathode to the right of the vertical axis. Current to the storage surface is negative—electrons reaching the surface and sticking—below the horizontal axis and positive—more electrons leaving the surface than reaching it—above the horizontal axis. The curve shows how current to the surface varies as the potential of the surface is varied.

If the surface is negative with respect to the cathode, the electrons shot toward it are turned back before they reach it and the current to the surface is zero. If the surface is just a little positive, the electrons shot toward it are slowed down by the retarding field between the very positive selectron grid and the much less positive storage surface, and they strike the surface feebly

and stick, constituting a negative current flow to the surface, and tending to make the surface more negative. If the potential of the storage surface is a little more positive with respect to the cathode, the electrons reach it with enough energy to knock a few electrons out of it. These are whisked away to the more positive selectron grid. These negative electrons leaving the surface are equivalent to a positive current to the surface. There are now as many electrons striking as before, but there are also some leaving, and there is less net negative current to the surface. Finally, at some potential labeled V_0 in Figure 6, one secondary electron is driven from the surface for each primary electron which strikes it, and the net current to the surface is zero. If the potential of the storage surface is higher than V_0 , each primary electron releases more than one secondary and there is a net flow of electrons away from the surface, equivalent to a positive current to the surface. This tends to make the storage surface more positive.

As the potential of the storage surface rises further above V_0 , the current for a time becomes more and more positive. Then, abruptly in the neighborhood of the potential V_s of the selectron grid itself, the current becomes negative again and stays negative. Why is this? The primary electrons still strike the storage surface energetically and drive out more than one electron each. The fact is that these sec-

ondary electrons leave the surface with very little speed. When the storage surface is more positive than the selectron grid, there is a retarding field at the storage surface which tends to turn the secondaries back toward the storage surface. Hence, there is still a flow of primaries—a negative current—to the surface, but the secondaries are turned back before reaching the selectron grid and fall on the storage surface again.

Thus, the current to the storage surface is again negative.

Our mechanism for holding the storage surface positive or negative is immediately apparent from Figure 6. If the surface is more positive than V_s , the current to it is negative and its potential will tend to fall. If the surface has a potential between V_0 and V_s , the current to it is positive and its potential will tend to rise. Hence, if the storage

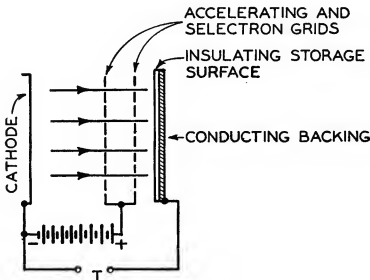


Figure 5. When a window in the selectron grid is open—the bars and rings on all sides positive—electrons shoot through it toward the storage surface. What happens to the electrons depends on the potential of the storage surface with respect to the cathode. The potential of the storage surface is controlled both by the flow of electrons to and from it, and by the potential of the conducting backing plate.

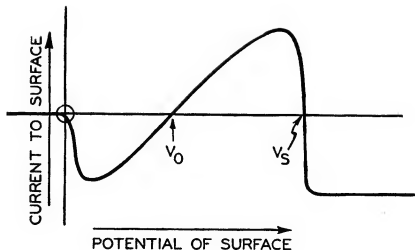


Figure 6. If the storage surface is negative with respect to the cathode, no electrons reach it—0 current. If it is a little positive, electrons reach it but few leave—negative current. If it is more positive, secondary electrons leave, and if it is more positive than some potential V_0 , more secondaries leave than primaries strike—positive current. If the storage surface is at a higher potential than V_s , the potential of the selectron grid, the secondaries which leave are turned back—negative current to the storage surface.

surface initially has any potential higher than V_0 , current will flow to it in such a way as to tend to make its potential V_s , the potential of the selectron grid. If, on the other hand, the potential is between 0 and V_0 , the current to the surface will be negative and the potential of the surface will tend to fall to 0. If the potential of the surface is negative with respect to the cathode—less than 0—there is no current to it from the electron stream and hence no tendency for the potential

to rise and fall. Actually, some leakage would probably result in a very slight tendency for the potential to rise.

We see, then, that when it is bombarded by electrons, a part of the storage surface tends naturally to assume one of two potentials, V_s or 0. If it has initially any other potential, it tends to come back to one of these. Which potential it assumes is determined by whether the initial potential is greater or less

than V_0 . Thus, if we store information on the part of the storage surface behind a particular window by making this area have a potential V_s with respect to the cathode—meaning, say, 1—or 0—meaning, 0—and if this potential changes a little through electrical leakage, perhaps to adjacent portions at a different potential, we can recover or *regenerate* the original potential merely by opening the window of the selectron grid and flooding the area with electrons. In fact, we can periodically regenerate the potentials behind all windows by opening all windows at once and flooding the whole surface with electrons. This is what is done in the operation of the selectron, and this regenerative feature, which makes it possible to retain the stored information indefinitely despite electrical leakage, is one of the most ingenious and important features of the selectron.

How do we get the information on the portions of the storage surface behind the various windows? That is, how do we initially bring some portions of the surface to the potential V_s and others to the potential V_0 ? In this process of writing information into the tube, we first open the particular one of the four thousand ninety-six windows behind which we wish to store a particular piece of information, thus flooding a little portion of the surface with electrons. Then, to the terminals T of Figure 5, between the cathode and the conducting backing of the storage surface, we apply a

very sharply rising positive pulse, shown as the dashed line of Figure 7. Because of the capacitance between this backing plate and the front of the storage surface, where the electrons fall, this drives the front of the storage surface positive. Then the pulse applied to the conducting backing falls slowly to zero, as shown. However, the action of the electrons falling on the surface tends to make it assume the potential V_s , and so if the pulse falls off slowly enough the portion of the surface on which electrons fall is left at the potential V_s , as shown by the solid line of Figure 7. Application of the pulse will leave the portion of the storage surface behind the open window at the potential V_s , regardless of whether its initial potential is V_s or 0, and the pulse will not affect portions of the surface behind closed windows, because no electrons reach them.

This tells us how we can bring any selected area of the storage surface to the potential V_s which, we can say, corresponds to writing 1 in a particular cell of this memory tube. By flooding a given area or cell with electrons and applying a sharply falling, negative pulse, which rises again gradually toward 0—the dashed pulse of Figure 7 upside down—we can bring any selected area of the storage surface to 0 potential, and thus write 0 in any selected cell of the memory.

Thus, each little area of the storage surface behind each window of the selectron grid is a cell of our

memory. By opening a particular window—through making one lead of each of the four sets of eight selectron grid leads positive—and pulsing the conducting backing positive or negative, we can make the little area of the storage surface behind that window assume a potential V_s or a potential O, and so can, in effect, write 1 or 0 in that particular memory cell. By opening all windows periodically and flooding all areas with electrons, we can periodically bring all little areas back to their proper potentials, either V_s or O, despite leakage of electrons to or away from the little areas. We can, that is, put thousands of pieces of information into the selectron and keep them there. What about reading? How can we get this information out?

Imagine that the entire inner storage surface is covered with a phosphor or fluorescent material like that used on cathode-ray tube screens or inside of fluorescent lights. Now, suppose we open one window of the selectron, shooting electrons at a particular area of the surface. If that area has a potential O, the electrons will be repelled from it. But, if that area has a potential V_s , corresponding to 1, the electrons will strike the fluorescent surface vigorously, emitting a glow of blue light. Suppose we let this light fall on a photo-multiplier, of the type Dr. Rajchman worked on earlier in his career. Then, when we open a given window of the selectron, if the potential of the surface behind

the window is O, we get nothing out of the multiplier. But, if the potential is V_s , there is a flash of light, and a pulse of current from the multiplier. And so, we can not only write a O or a 1 in each little memory cell of the selectron, we can not only keep this information there indefinitely, but we can also read it off at will.

Dr. Rajchman has devised other ways for reading the stored information in the selectron, but the use of a phosphor-coated storage surface together with a photo-multiplier has been one of the preferred methods. I have spoken of the phosphor as one giving blue light. This is because the photo-multiplier is more sensitive to blue light than to other colors. And so, I predicted that the memory cells of the thinking machines will be not only multitudinous and small, but also blue.

Of course the selectron provides only a part of the thinking machine—that is, the memory. Associated with it there must be circuits in tubes to seek out stored information, to make use of it to obtain new information, to write in that new information, and to make use of the new information in turn. All this is a field apart. Still, there is one wrinkle which is so intimately connected with the use of the selectron that it deserves mention here. I have referred to the O or 1 which a cell of the selectron can store as a binary digit or, alternately, as a letter of the electronic alphabet

which the machine understands. Now, usually we don't want to store isolated digits or letters: we want to store complete numbers or words—combinations of 1 and 0, as, 10011. This is 19 in binary notation, and might in some instance stand for the nineteenth word in a dictionary. When we look up a number or a word, we want it all at once, not piecemeal.

When we want to write many multi-digit numbers in a book, as,

in a table of logarithms, for instance, we usually assign a vertical column for each digit to be stored, and write each digit of a given number in a different column, along the same row. Thus, entries in a log table appear as in Figure 8. Suppose that in using the selectron we assign a different tube to each binary digit of the numbers to be stored. If we wish to store twenty-digit numbers, we will need twenty tubes. Each tube will, in effect, be a given

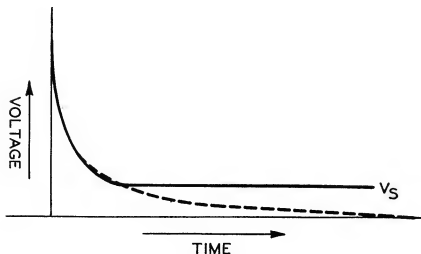


Figure 7. To make an element of the storage surface assume a potential V_s , its window is opened, it is flooded with electrons, and a sharp pulse is applied to the conducting backing. This drives the surface positive through capacitive coupling. The pulse is allowed to fall gradually to 0—dashed curve. The surface at first falls with the pulse, but the action of the electron stream tends to hold it at a potential V_s . A sharp negative pulse will leave the surface at 0 potential.

column of our storage space. The different cells in a tube will represent different rows. Thus, Cell 1 of Tube 1 will be Row 1 Column 1, Cell 1 of Tube 2 will be Row 1 Column 2, while Cell 10 of Tube 1 will be Row 10 Column 1, et cetera.

We want to look up all the digits in a given row at once. This means that we want to open corresponding windows in all the tubes at once, and so we can connect the corresponding selectron grid leads of all

	COLUMNS							
ROWS	4	0	0	6	0	2	0	6
	4	0	1	6	0	3	1	4
	4	0	2	6	0	4	2	3
	4	0	3	6	0	7	4	6

Figure 8. In storing multi-digit numbers in a table, we write the different digits of a given number in different columns, so that all of a given number will lie along a single horizontal row, as in the log table above. In storing binary digits of multi-digit binary numbers using electrons, a separate selectron is provided to represent each column. The rows are represented by the different windows. Thus, the first window of the first selectron is Row 1 Column 1, while the first window of the second selectron is Row 1 Column 2, et cetera.

twenty tubes together. Thus, if we want to store a number in Row 1, we apply voltages to the selectron grid leads which will open Window 1 in *all tubes*. We are then ready to read the number in Row 1 or to write a new number in. The twenty photo-multipliers which read the twenty selectrons are not connected in parallel, but are connected separately to carry off the twenty digits of the number in Row 1 to their proper destinations. Perhaps these twenty leads from the twenty photo-multipliers may go to the twenty backing plates of another twenty selectrons to which it is desired to transfer the number. We see, thus, how a whole table of numbers can be stored in twenty selectrons. The windows 1, 2, 3 et cetera, can represent, for instance, the angle of which we want the sine. The first selectron can store the first digits of all the sines, the second selectron can store all the second digits, et cetera. The twenty digits of the sine of any angle—any window number—can be read off simultaneously from the photo-multipliers of the twenty selectrons.

The selectron isn't perfect by any means. Perhaps it's not even the final answer. At the moment, in its early form, it may be almost as expensive as relays, but that's partly because it's new. It's certainly a great deal more compact than relays, a very great deal faster, and probably more reliable as well. It represents a first huge stride in the electronics of the thinking machine.

Just how far it takes us is up to a lot of mathematicians, a lot of circuit gadgeteers, and, especially, to Dr. Jan A. Rajchman and RCA, to whom we must look for smaller, cheaper and better selectrons.

THE END

YOU'LL BE SEEING TITANIUM!

Very few metallic elements are present in the Earth's crust in really large quantity; of those few, only iron, magnesium and aluminum have been useful as structural metals. Copper, lead, zinc, silver, tungsten, gold, platinum, cobalt, nickel—all are, actually rare contaminants in the planet's rocks. The common metallic elements include the big three, plus calcium, sodium, potassium, all familiar materials, and—titanium.

Titanium is not easy to refine from its ores—plentiful ores though they are—and nobody saw any particular reason for trying to refine it. But they do now, and they've developed mass-production techniques that will rapidly bring down the price of the metal. It turns out that titanium is one of the hottest metal discoveries of all time! Titanium is tough, very strong, halfway between aluminum and steel in weight, almost one hundred percent immune to corrosive atmospheres, and plentifully available in ore form. It is at least as strong as steel, even now when practically nothing is known of titanium's metallurgy, and its alloy possibilities, and so immune to corrosion, even in a brine-spray test, that it will make painting of structural parts of marine equipment unnecessary. It's a silvery-white metal, density 4.5 vs. 7.85 for iron and 2.70 for aluminum. Both steel and useful aluminum alloys corrode rapidly in brine-spray tests.

Titanium became of interest in one field after another in the last decade. First was the use of titanium dioxide as a white pigment for paints; it's whiter than white lead, and will not darken in sulphur-laden air. Then titanium dioxide was discovered by the electronics industries—see Locke's article on dielectrics in the August 1948 *Astounding*.

And now jewelers are going after titanium dioxide. A new discovery has been made; titanium dioxide, although plentiful in nature, does not occur as large clear crystals as do the oxides of zirconium (zircons), aluminum (ruby, sapphire, emerald) and beryllium (beryls). But synthetic crystals of TiO_2 have now been produced in sizes up to 80 carats or more—and they're astonishing jewels. They are water-white, blue-white, or any rainbow tint you wish by the inclusion of traces of impurities. And—the index of refraction is 2.70.

The importance of that statistic is this; diamond, the most brilliant of jewels, is brilliant because of its very high index of refraction, which breaks up and shatters the light rays striking the faceted crystal. But diamond has an index of only 2.4—titanium dioxide is appreciably more brilliant than the most brilliant of all heretofore known jewels!

You'll be hearing from titanium; space ships are very apt to be made of it. It has a high melting point, great strength and toughness (all of which aluminum and its alloys lack) and low weight plus resistance to corrosion which steel lacks.

THE PRISONER IN THE SKULL

BY LEWIS PADGETT

It isn't often a man gets hold of a slave like that! But John Fowler was just the man to use him hard, and to the last bit of his strength. Which, under the circumstances, was only justice. . .

Illustrated by Cartier

He felt cold and weak, strangely, intolerably, inhumanly weak with a weakness of the blood and bone, of the mind and soul. He saw his surroundings dimly, but he saw—other things—with a swimming clarity that had no meaning to him. He saw causes and effects as tangible before him as he had once seen trees and grass. But remote, indifferent, part of another world.

Somehow there was a door before him. He reached vaguely—

It was almost wholly a reflex-gesture that moved his finger toward the doorbell.

The chimes played three soft notes.

John Fowler was staring at a toggle switch. He felt baffled. The thing had suddenly spat at him and died. Ten minutes ago he had thrown the main switch, unscrewed the wall plate and made hopeful gestures with a screwdriver, but the only result was a growing suspicion that this switch would never work

again. Like the house itself, it was architecturally extreme, and the wires were sealed in so that the whole unit had to be replaced if it went bad.

Minor irritations bothered Fowler unreasonably today. He wanted the house in perfect running order for the guest he was expecting. He had been chasing Veronica Wood for a long time, and he had an idea this particular argument might tip the balance in the right direction.

He made a note to keep a supply of spare toggle switches handy. The chimes were still echoing softly as Fowler went into the hall and opened the front door, preparing a smile. But it wasn't Veronica Wood on the doorstep. It was a blank man.

That was Fowler's curious impression, and it was to recur to him often in the year to come. Now he stood staring at the strange emptiness of the face that returned his stare without really seeming to see him. The man's features were so



CARTIER

typical they might have been a matrix, without the variations that combine to make up the recognizable individual. But Fowler thought that even if he had known those features, it would be hard to recognize a man behind such utter emptiness. You can't recognize a man who isn't there. And there was

nothing here. Some erasure, some expunging, had wiped out all trace of character and personality. *Empty.*

And empty of strength, too—for the visitant lurched forward and fell into Fowler's arms.

Fowler caught him automatically, rather horrified at the lightness of

the body he found himself supporting. "Hey," he said, and, realizing the inadequacy of that remark, added a few pertinent questions. But there was no answer. Syncope had taken over.

Fowler grimaced and looked hopefully up and down the road. He saw nobody. So he lifted his guest across the threshold and carried him easily to a couch. *Fine*, he thought. *Veronica due any minute, and this paper weight barging in.*

Brandy seemed to help. It brought no color to the pale cheeks, but it pried the eyelids open to show a blank, wondering look.

"O. K. now?" Fowler asked, wanting to add, "Then go home."

There was only the questioning stare. Fowler stood up with some vague intention of calling a doctor, and then remembered that the television instrument hadn't yet been delivered. For this was a day when artificial shortages had begun to supplant real ones, when raw material was plentiful but consumers were wary, and were, therefore, put on a starvation diet to build their appetites and loosen their purse strings. The television would be delivered when the company thought Fowler had waited long enough.

Luckily he was versatile. As long as the electricity was on he could jury-rig anything else he needed, including facilities for first aid. He gave his patient the routine treatment, with satisfying results. Until, that is, the brandy suddenly hit cer-

tain nerve centers and emesis resulted.

Fowler lugged his guest back from the bathroom and left him on the bed in the room with the broken light switch to recuperate. Convalescence was rapid. Soon the man sat up, but all he did was look at Fowler hopefully. Questions brought no answer.

Ten minutes later the blank man was still sitting there, looking blank.

The door chimes sang again. Fowler, assured that his guest wasn't in *articulo mortis*, began to feel irritation. Why the devil did the guy have to barge in now, at this particular crucial moment? In fact, where had he come from? It was a mile to the nearest highway, along a dirt road, and there was no dust on the man's shoes. Moreover, there was something indefinably disturbing about the—*lack* in his appearance. There was no other word that fitted so neatly. Village idiots are popularly termed "wanting," and, while there was no question of idiocy here, the man did seem—

What?

For no reason at all Fowler shivered. The door chimes reminded him of Veronica. He said: "Wait here. You'll be all right. Just wait. I'll be back—"

There was a question in the soulless eyes.

Fowler looked around. "There're some books on the shelf. Or fix this—" He pointed to the wall switch. "If you want anything, call

me." On that note of haphazard solicitude he went out, carefully closing the door. After all, he wasn't his brother's keeper. And he hadn't spent days getting the new house in shape to have his demonstration go haywire because of an unforeseen interruption.

Veronica was waiting on the threshold. "Hello," Fowler said. "Have any trouble finding the place? Come in."

"It sticks up like a sore thumb," she informed him. "Hello. So this is the dream house, is it?"

"Right. After I figure out the right method of dream-analysis, it'll be perfect." He took her coat, led her into the livingroom, which was shaped like a fat comma and walled with triple-seal glass, and decided not to kiss her. Veronica seemed withdrawn. That was regrettable. He suggested a drink.

"Perhaps I'd better have one," she said, "before I look the joint over."

Fowler began battling with a functional bar. It should have poured and mixed drinks at the spin of a dial, but instead there came a tinkle of breaking glass. Fowler finally gave up and went back to the old-fashioned method. "Highball? Well, theoretically, this is a perfect machine for living. But the architect wasn't as perfect as his theoretical ideas. Methods of construction have to catch up with ideas, you know."

"This room's nice," Veronica acknowledged, relaxing on airfoam. With a glass in her hand, she seemed

more cheerful. "Almost everything's curved, isn't it? And I like the windows."

"It's the little things that go wrong. If a fuse blows, a whole unit goes out. The windows—I insisted on those."

"Not much of a view."

"Unimproved. Building restrictions, you know. I wanted to build on the top of a hill a few miles away, but the township laws wouldn't allow it. This house is unorthodox. Not very, but enough. I might as well have tried to put up a Wright house in Williamsburg. This place is functional and convenient—"

"Except when you want a drink?"

"Trivia," Fowler said airily. "A house is complicated. You expect a few things to go wrong at first. I'll fix 'em as they come up. I'm a jerk of all trades. Want to look around?"

"Why not?" Veronica said. It wasn't quite the enthusiastic reaction for which Fowler had hoped, but he made the best of it. He showed her the house. It was larger than it had seemed from the outside. There was nothing super about it, but it was—theoretically—a functional unit, breaking away completely from the hidebound traditions that had made attics, cellars, and conventional bathrooms and kitchens as vestigially unfunctional as the vermiform appendix. "Anyway," Fowler said, "statistics show most accidents happen in kitchens and bathrooms. They can't happen here."

"What's this?" Veronica asked, opening a door. Fowler grimaced.

"The guest room," he said. "That was the single mistake. I'll use it for storage or something. The room hasn't any windows."

"The light doesn't work—"

"Oh, I forgot. I turned off the main switch. Be right back." He hurried to the closet that held the house controls, flipped the switch, and returned. Veronica was looking into a room that was pleasantly furnished as a bedroom, and, with tinted, concealed fluorescents, seemed light and airy despite the lack of windows.

"I called you," she said. "Didn't you hear me?"

Fowler smiled and touched a wall. "Sound-absorbent. The whole house is that way. The architect did a good job, but this room—"

"What's wrong with it?"

"Nothing—unless you're inside and the door should get stuck. I've a touch of claustrophobia."

"You should face these fears," said Veronica, who had read it somewhere. Fowler repressed a slight irritation. There were times when he had felt an impulse to slap Veronica across the chops, but her gorgeousness entirely outweighed any weakness she might have in other directions.

"Air conditioning, too," he said, touching another switch. "Fresh as a spring breeze. Which reminds me. Does your drink want freshening?"

"Yes," Veronica said, and they returned to the comma-shaped room.

It was appreciably darker. The girl went to the window and stared through the immense, wall-long pane.

"Storm coming up," she said. "The car radio said it'll be a bad one. I'd better go, Johnny."

"Must you? You just got here."

"I have a date. Anyway, I've got to work early tomorrow." She was a Korys model, much in demand.

Fowler turned from the recalcitrant bar and reached for her hand.

"I wanted to ask you to marry me," he said.

There was silence, while leaden grayness pressed down beyond the window, and yellow hills rippled under the gusts of unfelt wind. Veronica met his gaze steadily.

"I know you did. I mean—I've been expecting you to."

"Well?"

She moved her shoulders uneasily.

"Not now."

"But—Veronica. Why not? We've known each other for a couple of years—"

"The truth is—I'm not sure about you, Johnny. Sometimes I think I love you. But sometimes I'm not sure I even like you."

He frowned. "I don't get that."

"Well, I can't explain it. It's just that I think you could be either a very nice guy or a very nasty one. And I'd like to be quite certain first. Now I've got to go. It's starting to rain."

On that note she went out, leaving Fowler with a sour taste in his mouth. He mixed himself another

drink and wandered over to his drawing board, where some sketches were sheafed up in a disorderly fashion. Nuts. He was making good dough at commercial art, he'd even got himself a rather special house—

One of the drawings caught his eye. It was a background detail, intended for incorporation later in a larger picture. It showed a gargoyle, drawn with painstaking care, and a certain quality of vivid precision that was very faintly unpleasant. Veronica—

Fowler suddenly remembered his guest and hastily set down his drink. He had avoided that room during the tour of inspection, managing to put the man completely out of his mind. That was too bad. He could have asked Veronica to send out a doctor from the village.

But the guest didn't seem to need a doctor. He was working on the wall-switch, at some danger, Fowler thought, of electrocuting himself. "Look out!" Fowler said sharply. "It's hot!" But the man merely gave him a mild, blank stare and passed his hand downward before the panel.

The light went out.

It came on again, to show the man finishing an upward gesture.

No toggle switch stub protruded from the slot in the center of the plate. Fowler blinked. "What—?" he said.

Gesture. Blackout. Another gesture.

"What did you do to that?" Fow-

ler asked, but there was no audible reply.

Fowler drove south through the storm, muttering about ham electricians. Beside him the guest sat, smiling vacantly. The one thing Fowler wanted was to get the guy off his hands. A doctor, or a cop, in the village, would solve that particular problem. Or, rather, that would have been the solution, if a minor landslide hadn't covered the road at a crucial point.

With difficulty Fowler turned the car around and drove back home, cursing gently.

The blank man sat obediently at his side.

They were marooned for three days. Luckily the larder was well-stocked, and the power lines, which ran underground, weren't cut by the storm. The water-purifying unit turned the muddy stream from outside into crystalline nectar, the FM set wasn't much bothered by atmospheric disturbances, and Fowler had plenty of assignments to keep him busy at his drawing board. But he did no drawing. He was exploring a fascinating, though unbelievable, development.

The light switch his guest had rigged was unique. Fowler discovered that when he took the gadget apart. The sealed plastic had been broken open, and a couple of wires had been rewound in an odd fashion. The wiring didn't make much sense to Fowler. There was no photo-

electric hookup that would have explained it. But the fact remained that he could turn on the lights in that room by moving his hand upward in front of the switch plate, and reverse the process with a downward gesture.

He made tests. It seemed as though an invisible fourteen-inch beam extended directly outward from the switch. At any rate, gestures, no matter how emphatic, made beyond that fourteen-inch distance had no effect on the lights at all.

Curious, he asked his guest to rig up another switch in the same fashion. Presently all the switches in the house were converted, but Fowler was no wiser. He could duplicate the hookup, but he didn't understand the principle. He felt a little frightened.

Locked in the house for three days, he had time to wonder and worry. He fed his guest—who had forgotten the use of knife and fork, if he had ever known it—and he tried to make the man talk. Not too successfully.

Once the man said: "Forgotten . . . forgotten—"

"You haven't forgotten how to be an electrician. Where did you come from?"

The blank face turned to him. "Where?" A pause. And then—

"When? Time . . . time—"

Once he picked up a newspaper and pointed questioningly at the date line—the year.

"That's right," Fowler said, his

stomach crawling. "What year did you think it was?"

"Wrong—" the man said. "Forgotten—"

Fowler stared. On impulse, he got up to search his guest's pockets. But there were no pockets. The suit was ordinary, though slightly strange in cut, but it had no pockets.

"What's your name?"

No answer.

"Where did you come from? Another—time?"

Still no answer.

Fowler thought of robots. He thought of a soulless world of the future peopled by automatons. But he knew neither was the right answer. The man sitting before him was horribly normal. And empty, somehow—drained. Normal?

The norm? That non-existent, figurative symbol which would be monstrous if it actually appeared? The closer an individual approaches the norm, the more colorless he is. Just as a contracting line becomes a point, which has few, if any, distinguishing characteristics. One point is exactly like another point. As though humans, in some unpleasant age to come, had been reduced to the lowest common denominator.

The norm.

"All right," Fowler said. "I'll call you Norman, till you remember your right name. But you can't be a . . . point. You're no moron. You've got a talent for electricity, anyhow."

Norman had other talents, too, as Fowler was to discover soon. He grew tired of looking through the window at the gray, pouring rain, pounding down over a drenched and dreary landscape, and when he tried to close the built-in Venetian shutters, of course they failed to work. "May that architect be forced to live in one of his own houses," Fowler said, and, noticing Norman made explanatory gestures toward the window.

Norman smiled blankly.

"The view," Fowler said. "I don't like to see all that rain. The shutters won't work. See if you can fix them. The view—" He explained patiently, and presently Norman went out to the unit nominally called a kitchen, though it was far more efficient. Fowler shrugged and sat down at his drawing board. He looked up, some while later, in time to see Norman finish up with a few swabs of a cloth. Apparently he had been painting the window with water.

Fowler snorted. "I didn't ask you to wash it," he remarked. "It was the shutters—"

Norman laid a nearly empty basin on a table and smiled expectantly. Fowler suffered a slight reorientation. "Time-traveling, ha," he said. "You probably crashed out of some booby hatch. The sooner I can get you back there the better I'll like it. If it'd only stop raining . . . I wonder if you could rig up the televiser? No, I forgot. We don't even have one yet. And I suspect you couldn't

do it. That light switch business was a fluke."

He looked out at the rain and thought of Veronica. Then she was there before him, dark and slender, smiling a little.

"Wha—" Fowler said throatily.

He blinked. Hallucinations? He looked again, and she was still there, three-dimensionally, outside the window—

Norman smiled and nodded. He pointed to the apparition.

"Do you see it too?" Fowler asked madly. "It can't be. She's outside. She'll get wet. What in the name of—"

But it was only Fowler who got wet, dashing out bareheaded in the drenching rain. There was no one outside. He looked through the window and saw the familiar room, and Norman:

He came back. "Did you paint her on the window?" he asked. "But you've never seen Veronica. Besides, she's moving—three-dimensional. Oh, it can't be. My mind's snapping. I need peace and quiet. A green thought in a green shade." He focused on a green thought, and Veronica faded out slowly. A cool, quiet, woodland glade was visible through the window.

After a while Fowler figured it out. His window made thoughts visible.

It wasn't as simple as that, naturally. He had to experiment and brood for quite some time. Norman was no help. But the fact finally emerged that whenever Fowler

looked at the window and visualized something with strong emphasis, an image of that thought appeared—a projective screen, so to speak.

It was like throwing a stone into calm water. The ripples moved out for a while, and then slowly quieted. The woodland scene wasn't static; there was a breeze there, and the leaves glittered and the branches swayed. Clouds moved softly across a blue sky. It was a scene Fowler finally recognized, a Vermont woodland he had seen years ago. Yet when did sequoias ever grow in Vermont?

A composite, then. And the original impetus of his thoughts set the scene into action along normal lines. When he visualized the forest, he had known that there would be a wind, and that the branches would move. So they moved. But slower and slower—though it took a long while for the action to run down.

He tried again. This time Chi-



cago's lake shore. Cars rushed along the drive. He tried to make them run backwards, but got a sharp headache and a sense of watching a jerky film. Possibly he could reverse the normal course of events, but his mind wasn't geared to handle film running backward. Then he thought hard and watched a seascape appear through the glass. This time he waited to see how long it would take the image to vanish. The action stopped in an hour, but the picture did not fade completely for another hour.

Only then did the possibilities strike him with an impact as violent as lightning.

Considerable poetry has been written about what happens when love rejected turns to hate. Psychology could explain the cause as well as the effect—the mechanism of displacement. Energy has to go somewhere, and if one channel is blocked, another will be found. Not that Veronica had definitely rejected Fowler, and certainly his emotion for the girl had not suffered an alchemic transformation, unless one wishes to delve into the abysses of psychology in which love is merely the other face of hatred—but on those levels of semantic confusion you can easily prove anything.

Call it reorientation. Fowler had never quite let himself believe that Veronica wouldn't fall into his arms. His ego was damaged. Consequently it had to find some other justification, some assurance—and

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it was unfortunate for Norman that the displacement had to occur when he was available as scapegoat. For the moment Fowler began to see the commercial possibilities of the magic windowpane, Norman was doomed.

Not at once; in the beginning, Fowler would have been shocked and horrified had he seen the end result of his plan. He was no villain, for there are no villains. There is a check-and-balance system, as inevitable in nature and mind as in politics, and the balance was beginning to tip when Fowler locked Norman in the windowless room for safekeeping and drove to New York to see a patent attorney. He was careful at first. He knew the formula for the telepathically-receptive window paint by now, but he merely arranged to patent the light-switch gadget that was operated by a gesture. Afterwards, he regretted his ignorance, for clever infringements appeared on the heels of his own device. He hadn't known enough about the matter to protect himself thoroughly in the patent.

By a miracle, he had kept the secret of the telepathic paint to himself. All this took time, naturally, and meanwhile Norman, urged on by his host, had made little repairs and improvements around the house. Some of them were impractical, but others were decidedly worth using—short-cuts, conveniences, clever methods of bridging difficulties that would be worth money in the open market. Norman's way of thinking seemed curiously alien. Given a

problem, he could solve it, but he had no initiative on his own. He seemed satisfied to stay in the house—

Well, satisfied was scarcely the word. He was satisfied in the same sense that a jellyfish is satisfied to remain in its pool. If there were quivers of volition, slight directional stirrings, they were very feeble indeed. There were times when Fowler, studying his guest, decided that Norman was in a psychotic state—catatonic stupor seemed the most appropriate label. The man's will was submerged, if, indeed, he had ever had any.

No one has ever detailed the probable reactions of the man who owned the goose who laid the golden eggs. He brooded over a mystery, and presently took empirical steps, afterwards regretted. Fowler had a more analytical mind, and suspected that Norman might be poised at a precarious state of balance, during which—and only during which—he laid golden eggs. Metal can be pliable until pressure is used, after which it may become work-hardened and inflexible. Fowler was afraid of applying too much pressure. But he was equally afraid of not finding out all he could about the goose's unusual oviparity.

So he studied Norman. It was like watching a shadow. Norman seemed to have none of the higher reflexes; his activities were little more than tropism. Ego-consciousness was present, certainly, but—where had he come from? What

sort of place or time had it been? Or was Norman simply a freak, a lunatic, a mutation? All that seemed certain was that part of his brain didn't know its own function. Without conscious will or volition, it was useless. Fowler had to supply the volition; he had to give orders. Between orders, Norman simply sat, occasionally quivering slightly.

It was bewildering. It was fascinating.

Also, it might be a little dangerous. Fowler had no intention of letting his captive escape if he could help it, but vague recollections of peonage disturbed him sometimes. Probably this was illegal. Norman ought to be in an institution, under medical care. But then, Norman had such unusual talents!

Fowler, to salve his uneasiness, ceased to lock the door of the windowless room. By now he had discovered it was unnecessary, anyhow. Norman was like a subject in deep hypnosis. He would obey when told not to leave the room. Fowler, with a layman's knowledge of law, thought that probably gave him an out. He pictured himself in the dock blandly stating that Norman had never been a prisoner, had always been free to leave the house if he chose.

Actually, only hunger would rouse Norman to disobey Fowler's commands to stay in his room. He would have to be almost famished, even then, before he would go to the kitchen and eat whatever he found,

without discrimination and apparently without taste.

Time went by. Fowler was re-orienting, though he scarcely knew it yet, toward a whole new set of values. He let his illustrating dwindle away until he almost ceased to accept orders. This was after an abortive experiment with Norman in which he tried to work out on paper an equivalent of the telepathic pictures on glass. If he could simply sit and *think* his drawings onto bristol board—

That was, however, one of Norman's failures.

It wasn't easy to refrain from sharing this wonderful new secret with Veronica. Fowler found himself time and again shutting his lips over the information just in time. He didn't invite her out to the house any more; Norman was too often working at odd jobs around the premises. Beautiful visions of the future were building up elaborately in Fowler's mind—Veronica wrapped in mink and pearls, himself commanding financial empires all based on Norman's extraordinary talents and Norman's truly extraordinary willingness to obey.

That was because of his physical weakness, Fowler felt sure. It seemed to take so much of Norman's energy simply to breathe and eat that nothing remained. And after the solution of a problem, a complete fatigue overcame him. He was useless for a day or two between jobs, recovering from the utter exhaustion that work seemed to induce.

Fowler was quite willing to accept that. It made him even surer of his—guest. The worst thing that could happen, of course, would be Norman's recovery, his return to normal—

Money began to come in very satisfactorily, although Fowler wasn't really a good business man. In fact, he was a remarkably poor one. It didn't matter much. There was always more where the first had come from.

With some of the money Fowler started cautious inquiries about missing persons. He wanted to be sure no indignant relatives would turn up and demand an accounting of all this money. He questioned Norman futilely.

Norman simply could not talk. His mind was too empty for coherence. He could produce words, but he could not connect them. And this was a thing that seemed to give him his only real trouble. For he wanted desperately sometimes to speak. There was something he seemed frantic to tell Fowler, in the intervals when his strength was at its peak.

Fowler didn't want to know it. Usually when Norman reached this pitch he set him another exhausting problem. Fowler wondered for awhile just why he dreaded hearing the message. Presently he faced the answer.

Norman might be trying to explain how he could be cured.

Eventually, Fowler had to face an even more unwelcome truth. Norman did seem in spite of everything to be growing stronger.

He was working one day on a vibratory headset gimmick later to be known as a Hed-D-Acher, when suddenly he threw down his tools and faced Fowler over the table with a look that bordered on animation—for Norman.

"Sick—" he said painfully. "I . . . know . . . *work!*" It was an anathema. He made a defiant gesture and pushed the tools away.

Fowler, with a sinking sensation, frowned at the rebellious nonentity.

"All right, Norman," he said soothingly. "All right. You can rest when you finish this job. You must finish it first, though. You must finish this job, Norman. Do you understand that? You must finish—"

It was sheer accident, of course—or almost accident—that the job turned out to be much more complicated than Fowler had expected. Norman, obedient to the slow, repeated commands, worked very late and very hard.

The end of the job found him so completely exhausted he couldn't speak or move for three days.

As a matter of fact it was the Hed-D-Acher that turned out to be an important milestone in Fowler's progress. He couldn't recognize it at the time, but when he looked back, years later, he saw the occasion of his first serious mistake. His first,

that is, unless you count the moment when he lifted Norman across his threshold at the very start of the thing.

Fowler had to go to Washington to defend himself in some question of patent infringement. A large firm had found out about the Hed-D-Acher and jumped in on the grounds of similar wiring—at least that was Fowler's impression. He was no technician. The main point was that the Hed-D-Acher couldn't be patented in its present form, and Fowler's rivals were trying to squeeze through a similar—and stolen—Hed-D-Acher of their own.

Fowler phoned the Korys Agency. Long distance television was not on the market yet and he was not able to see Veronica's face, but he knew what expression must be visible on it when he told her what he wanted.

"But I'm going out on a job, John. I can't just drop everything and rush out to your house."

"Listen, Veronica, there may be a hundred thousand bucks in it. I . . . there's no one else I can trust." He didn't add his chief reason for trusting her—the fact that she wasn't over-bright.

In the end, she went. Dramatic situations appealed to her, and he dropped dark hints of corporation espionage and bloody doings on Capitol Hill. He told her where to find the key and she hung up, leaving Fowler to gnaw his nails intermittently and try to ligit himself to one whiskey-soda every half hour.

He was paged, it seemed to him, some years later.

"Hello, Veronica?"

"Right. I'm at the house. The key was where you said. Now what?"

Fowler had had time to work out a plan. He put pencil and note pad on the jutting shelf before him and frowned slightly. This might be a risk, but—

But he intended to marry Veronica, so it was no great risk. And she wasn't smart enough to figure out the real answers.

He told her about the windowless room. "That's my houseboy's—Norman. He's slightly half-witted, but a good boy on mechanical stuff. Only he's a little deaf, and you've got to tell him a thing three times before he understands it."

"I think I'd better get out of here," Veronica remarked. "Next you'll be telling me he's a homicidal maniac."

Fowler laughed heartily. "There's a box in the kitchen—it's in that red cupboard with the blue handle. It's pretty heavy. But see if you can manage it. Take it in to Norman and tell him to make another Hed-D-Acher with a different wiring circuit."

"Are you drunk?"

Fowler repressed an impulse to bite the mouthpiece off the telephone. His nerves were crawling under his skin. "This isn't a gag, Veronica. I told you how important it is. A hundred thousand bucks isn't funny. Look, got a pencil? Write this

down." He dictated some technical instructions he had gleaned by asking the right questions. "Tell that to Norman. He'll find all the materials and tools he needs in the box."

"If this is a gag—" Veronica said, and there was a pause. "Well, hang on."

Silence drew on. Fowler tried to hear what was happening so many miles away. He caught a few vague sounds, but they were meaningless. Then voices rose in loud debate.

"Veronica!" Fowler shouted. "Veronica!" There was no answer.

After that, voices again, but softer. And presently:

"Johnny," Veronica said, "if you ever pull a trick like that on me again—"

"What happened?"

"Hiding a gibbering idiot in your house—" She was breathing fast.

"He's . . . what did he do? *What happened?*"

"Oh, nothing. Nothing at all. Except when I opened the door your houseboy walked out and began running around the house like a . . . a bat. He was trying to talk—Johnny, he scared me!" She was plaintive.

"Where is he now?"

"Back in his room. I . . . I was afraid of him. But I was trying not to show it. I thought if I could get him back in and lock the door—I spoke to him, and he swung around at me so fast I guess I let out a yell. And then he kept trying to say something—"

"What?"

"How should I know? He's in his room, but I couldn't find a key to it. I'm not staying here a minute longer. I . . . *here he comes!*"

"Veronica! Tell him to go back to his room. Loud and—like you mean it!"

She obeyed. Fowler could hear her saying it. She said it several times.

"It doesn't work. He's going out—"

"Stop him!"

"I won't! I had enough trouble coaxing him back the first time—"

"Let me talk to him," Fowler said suddenly. "He'll obey me. Hold the phone to his ear. Get him to listen to me." He raised his voice to a shout. "*Norman! Come here! Listen to me!*" Outside the booth people were turning to stare, but he ignored them.

He heard a faint mumble and recognized it.

"Norman," he said, more quietly, but with equal firmness. "Do exactly what I tell you to do. Don't leave the house. Don't leave the house. *Don't leave the house.* Do you understand?"

Mumble. Then words: "Can't get out . . . can't—"

"Don't leave the house. Build another Hed-D-Acher. Do it now. Get the equipment you need and build it in the living room, on the table where the telephone is. Do it now."

A pause, and then Veronica said, shakily: "He's gone back to his

room. Johnny, I . . . he's coming back! With that box of stuff—"

"Let me talk to him again. Get yourself a drink. A couple of 'em." He needed Veronica as his interpreter, and the best way to keep her there would be with the aid of Dutch courage.

"Well—here he is."

Norman mumbled.

Fowler referred to his notes. He gave firm, incisive, detailed directions. He told Norman exactly what he wanted. He repeated his orders several times.

And it ended with Norman building a Hed-D-Acher, with a different type of circuit, while Veronica watched, made measurements as Fowler commanded, and relayed the information across the wire. By the time she got slightly high, matters were progressing more smoothly. There was the danger that she might make inaccurate measurements, but Fowler insisted on check and double-check of each detail.

Occasionally he spoke to Norman. Each time the man's voice was weaker. The dangerous surge of initiative was passing as energy drained out of Norman while his swift fingers flew.

In the end, Fowler had his information, and Norman, completely exhausted, was ordered back to his room. According to Veronica, he went there obediently and fell flat on the floor.

"I'll buy you a mink coat," Fowler said. "See you later."

"But—"

"I've got to hurry. Tell you all about it when I see you."

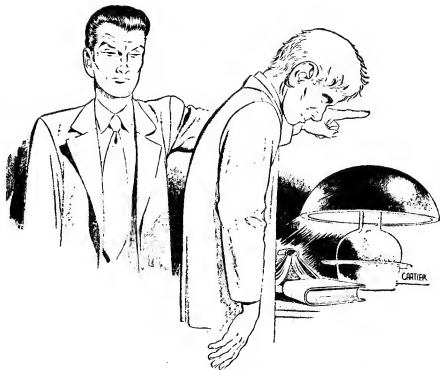
He got the patent, by the skin of his teeth. There was instant litigation, which was why he didn't clean up on the gadget immediately. He was willing to wait. The goose still laid golden eggs.

But he was fully aware of the danger now. He had to keep Norman busy. For unless the man's strength remained at a minimum, initiative would return. And there would be nothing to stop Norman from walking out of the house, or—

Or even worse. For Fowler could, after all, keep the doors locked. But he knew that locks wouldn't imprison Norman long once the man discovered how to pose a problem to himself. Once Norman thought: *Problem how to escape*—then his clever hands would construct a wall-melter or a matter-transmitter, and that would be the end for Fowler.

Norman had one specialized talent. To keep that operating efficiently—for Fowler's purpose—all Norman's other faculties had to be cut down to minimum operation speed.

The rosy light in the high-backed booth fell flatteringly upon Veronica's face. She twirled her martini glass on the table and said: "But John, I don't think I want to marry you." The martini glass shot pin-points of soft light in his face as she turned it. She looked remarkably



pretty, even for a Korys model. Fowler felt like strangling her.

"Why not?" he demanded.

She shrugged. She had been blowing hot and cold, so far as Fowler was concerned, ever since the day she had seen Norman. Fowler had been able to buy her back, at intervals, with gifts or moods that appealed to her, but the general drift had been toward estrangement. She wasn't intelligent, but she did have sensitivity of a sort, and it served its purpose. It was stopping her from marrying John Fowler.

"Maybe we're too much alike,

Johnny," she said reflectively. "I don't know. I . . . how's that miserable house-boy of yours?"

"Is *that* still bothering you?" His voice was impatient. She had been showing too much concern over Norman. It had probably been a mistake to call her in at all, but what else could he have done? "I wish you'd forget about Norman. He's all right."

"Johnny, I honestly do think he ought to be under a doctor's care. He didn't look at all well that day. Are you sure—"

"Of course I'm sure! What do

you take me for? As a matter of fact, he is under a doctor's care. Norman's just feeble-minded. "I've told you that a dozen times, Veronica. I wish you'd take my word for it. He . . . he sees a doctor regularly. It was just having you there that upset him. Strangers throw him off his balance. He's fine now. Let's forget about Norman. We were talking about getting married, remember?"

"You were. Not me. No, Johnny, I'm afraid it wouldn't work." She looked at him in the soft light, her face clouded with doubt and—was it suspicion? With a woman of Veronica's mentality, you never knew just where you stood. Fowler could reason her out of every objection she offered to him, but because reason meant so little to her, the solid substratum of her convictions remained unchanged.

"You'll marry me," he said, his voice confident.

"No." She gave him an uneasy look and then drew a deep breath and said: "You may as well know this now, Johnny—I've just about decided to marry somebody else."

"Who?" He wanted to shout the question, but he forced himself to be calm.

"No one you know. Ray Barnaby. I . . . I've pretty well made up my mind about it, John."

"I don't know the man," Fowler told her evenly, "but I'll make it my business to find out all I can."

"Now John, let's not quarrel. I—"

"You're going to marry me or nobody, Veronica." Fowler was astonished at the sudden violence of his own reaction. "Do you understand that?"

"Don't be silly, John. You don't own me."

"I'm not being silly! I'm just telling you."

"John, I'll do exactly as I please. Now, let's not quarrel about it."

Until now, until this moment of icy rage, he had never quite realized what an obsession Veronica had become. Fowler had got out of the habit of being thwarted. His absolute power over one individual and one unchanging situation was giving him a taste for tyranny. He sat looking at Veronica in the pink dimness of the booth, grinding his teeth together in an effort not to shout at her.

"If you go through with this, Veronica, I'll make it my business to see you regret it as long as you live," he told her in a harsh, low voice.

She pushed her half-emptied glass aside with sudden violence that matched his. "Don't get me started, John Fowler!" she said angrily. "I've got a temper, too! I've always known there was something I didn't like about you."

"There'll be a lot more you don't like if you—"

"That's enough, John!" She got up abruptly, clutching at her slipping handbag. Even in this soft light he could see the sudden hardening of her face, the lines of anger pinching

downward along her nose and mouth. A perverse triumph filled him because at this moment she was ugly in her rage, but it did not swerve his determination.

"You're going to marry me," he told her harshly. "Sit down. You're going to marry me if I have to—" He paused.

"To what?" Her voice was goading. He shook his head. He couldn't finish the threat aloud.

Norman will help me, he was thinking in cold triumph. *Norman will find a way.*

He smiled thinly after her as she stalked in a fury out of the bar.

For a week Fowler heard no more from her. He made inquiries about the man Barnaby and was not surprised to learn that Veronica's intended—if she had really been serious about the fellow, after all—was a young broker of adequate income and average stupidity. A non-entity. Fowler told himself savagely that they were two of a kind and no doubt deserved each other. But his obsession still ruled him, and he was determined that no one but himself should marry Veronica.

Short of hypnosis, there seemed no immediate way to change her mind. But perhaps he could change Barnaby's. He believed he could, given enough time. Norman was at work on a rather ingenious little device involving the use of a trick lighting system. Fowler had been impressed, on consideration, by the

effect of the rosy light in the bar on Veronica's appearance.

Another week passed, with no news about Veronica. Fowler told himself he could afford to remain aloof. He had the means to control her very nearly within his grasp. He would watch her, and wait his time in patience.

He was very busy, too, with other things. Two more devices were ready for patenting—the Magic Latch keyed to fingerprint patterns, and the Haircut Helmet that could be set for any sort of hair trimming and would probably wreak havoc among barbers. But litigation on the Hed-D-Acher was threatening to be expensive, and Fowler had learned already to live beyond his means. Far beyond. It seemed ridiculous to spend only what he took in each day, when such fortunes in royalties were just around the corner.

Twice he had to take Norman off the lighting device to perform small tasks in other directions. And Norman was in himself a problem.

The work exhausted him. It had to exhaust him. That was necessary. An unpleasant necessity, of course, but there it was. Sometimes the exhaustion in Norman's eyes made one uncomfortable. Certainly Norman suffered. But because he was seldom able to show it plainly, Fowler could tell himself that perhaps he imagined the worst part of it. Casuistry, used to good purpose, helped him to ignore what he preferred not to see.

By the end of the second week, Fowler decided not to wait on Veronica any longer. He bought a dazzling solitaire diamond whose cost faintly alarmed even himself, and a wedding band that was a full circle of emerald-cut diamonds to complement it. With ten thousand dollars worth of jewelry in his pocket, he went into the city to pay her a call.

Barnaby answered the door.

Stupidly Fowler heard himself saying: "Miss Wood here?"

Barnaby, grinning, shook his head and started to answer. Fowler knew perfectly well what he was about to say. The fatuous grin would have told him even if some accurate sixth sense had not already made it clear. But he wouldn't let Barnaby say it. He thrust the startled bridegroom aside and shouldered angrily into the apartment, calling: "Veronica! Veronica, where are you?"

She came out of the kitchen in a ruffled apron, apprehension and defiance on her face.

"You can just get right out of here, John Fowler," she said firmly. Barnaby came up from behind him and began a blustering remonstrance, but she slipped past Fowler and linked her arm with Barnaby's, quieting him with a touch.

"We were married day before yesterday, John," she said.

Fowler was astonished to discover that the cliché about a red swimming haze of rage was perfectly true. The room and the bridal couple shimmered before him for an instant.

He could hardly breathe in the suffocating fury that swam in his brain.

He took out the white velvet box, snapped it open and waved it under Veronica's nose. Liquid fire quivered in the myriad cut surfaces of the jewels and for an instant pure greed made Veronica's face as hard as the diamonds.

Barnaby said: "I think you'd better go, Fowler."

In silence, Fowler went.

The little light-device wouldn't do now. He would need something more powerful for his revenge. Norman put the completed gadget aside and began to work on something new. There would be a use for the thing later. Already plans were spinning themselves out in Fowler's mind.

They would be expensive plans. Fowler took council with himself and decided that the moment had come to put the magic window on the market.

Until now he had held this in reserve. Perhaps he had even been a little afraid of possible repercussions. He was artist enough to know that a whole new art-form might result from a practical telepathic projector. There were so many possibilities—

But the magic window failed.

Not wholly, of course. It was a miracle, and men always will buy miracles. But it wasn't the instant, overwhelming financial success Fowler had felt certain it would be.

For one thing, perhaps this was too much of a miracle. Inventions can't become popular until the culture is ready for them. Talking films were made in Paris by Méliès around 1890, but perhaps because that was a double miracle, nobody took to the idea. As for a telepathic screen—

It was a specialized luxury item. And it wasn't as easy or as safe to enjoy as one might suppose. For one thing, few minds turned out to be disciplined enough to maintain a picture they deliberately set out to evoke. As a mass entertaining medium it suffered from the same faults as family motion pictures—other peoples' memories and dreams are notoriously boring unless one sees oneself in them.

Besides, this was too close to pure telepathy to be safe. Fowler had lived alone too long to remember the perils of exposing one's thoughts to a group. Whatever he wanted to project on his private window, he projected. But in the average family it wouldn't do. It simply wouldn't do.

Some Hollywood companies and some millionaires leased windows—Fowler refused to sell them outright. A film studio photographed a batch of projected ideations and cut them into a dream sequence for a modern Cinderella story. But trick photography had already done work so similar that it made no sensation whatever. Even Disney had done some of the stuff better. Until trained imaginative projective artists could

be developed, the windows were simply not going to be a commercial success.

One ethnological group tried to use a window to project the memories of oldsters in an attempt to recapture everyday living customs of the recent past, but the results were blurred and inaccurate, full of anachronisms. They all had to be winnowed and checked so completely that little of value remained. The fact stood out that the ordinary mind is too undisciplined to be worth anything as a projector. Except as a toy, the window was useless.

It was useless commercially. But for Fowler it had one intrinsic usefulness more valuable than money—

One of the wedding presents Veronica and Barnaby received was a telepathic window. It came anonymously. Their suspicions should have been roused. Perhaps they were, but they kept the window. After all, in her modeling work Veronica had met many wealthy people, and Barnaby also had moneyed friends, any of whom might in a generous mood have taken a window-lease for them as a goodwill gesture. Also, possession of a magic window was a social distinction. They did not allow themselves to look the gift-horse too closely in the mouth. They kept the window.

They could not have known—though they might have guessed—that this was a rather special sort of window. Norman had been at work on it through long, exhausting hours, while Fowler stood over him with

the goading repetitious commands that kept him at his labor.

Fowler was not too disappointed at the commercial failure of the thing. There were other ways of making money. So long as Norman remained his to command the natural laws of supply and demand did not really affect him. He had by now almost entirely ceased to think in terms of the conventional mores. Why should he? They no longer applied to him. His supply of money and resources was limitless. He never really had to suffer for a failure. It would always be Norman, not Fowler, who suffered.

There was unfortunately no immediate way in which he could check how well his magic window was working. To do that you would have to be an invisible third person in the honeymoon apartment. But Fowler, knowing Veronica as he did, could guess.

The window was based on the principle that if you give a child a jackknife he'll probably cut himself.

Fowler's first thought had been to create a window on which he could project his own thoughts, disguised as those of the bride or groom. But he had realized almost immediately that a far more dangerous tool lay ready-made in the minds of the two whose marriage he meant to undermine.

"It isn't as if they wouldn't break up anyhow, in a year or two," he told himself as he speculated on the possibilities of his magic window.

He was not justifying his intent. He didn't need to, any more. He was simply considering possibilities. "They're both stupid, they're both selfish. They're not material you could make a good marriage of. This ought to be almost too easy—"

Every man, he reasoned, has a lawless devil in his head. What filters through the censor-band from the unconscious mind is controllable. But the lower levels of the brain are utterly without morals.

Norman produced a telepathic window that would at times project images from the unconscious mind.

It was remotely controlled, of course; most of the time it operated on the usual principles of the magic window. But whenever Fowler chose he could throw a switch that made the glass twenty miles away hypersensitive.

Before he threw it for the first time, he televised Veronica. It was evening. When the picture dawned in the television screen he could see the magic window set up in its elegant frame within range of the television, so that everyone who called might be aware of the Barnaby's distinction.

Luckily it was Veronica who answered, though Barnaby was visible in the background, turning toward the visor an interested glance that darkened when Fowler's face dawned upon the screen. Veronica's politely expectant look turned sullen as she recognized the caller.

"Well?"

Fowler grinned. "Oh, nothing."

Just wondered how you were getting along."

"Beautifully, thanks. Is that all?"

Fowler shrugged. "If that's the way you feel, yes."

"Good-by," Veronica said firmly, and flicked the switch. The screen before Fowler went blank. He grinned. All he had wanted to do was remind her of himself. He touched the stud that would activate that magic window he had just seen, and settled down to wait.

What would happen now he didn't know. Something would. He hoped the sight of him had reminded Veronica of the dazzling jewelry he had carried when they last met. He hoped that upon the window now would be dawning a covetous image of those diamonds, clear as dark water and quivering with fiery light. The sight should be enough to rouse resentment in Barnaby's mind, and when two people quarrel wholeheartedly, there are impulses toward mayhem in even the most civilized mind. It should shock the bride and groom to see on a window that reflected their innermost thoughts a picture of hatred and wishful violence. Would Veronica see herself being strangled in effigy in the big wall-frame? Would Barnaby see himself bleeding from the deep scratches his bride would be yearning to score across his face?

Fowler sat back comfortably, luxuriating in speculation.

It might take a long time. It

might take years. He was willing to wait.

It took even longer than Fowler had expected. Slowly the poison built up in the Barnaby household, very slowly. And in that time a different sort of toxicity developed in Fowler's. He scarcely realized it. He was too close.

He never recognized the moment when his emotional balance shifted and he began actively to hate Norman.

The owner of the golden goose must have lived under considerable strain. Every day when he went out to look in the nest he must have felt a quaking wonder whether this time the egg would be white, and valuable only for omelets or hatching. Also, he must have had to stay very close to home, living daily with the nightmare of losing his treasure—

Norman was a prisoner—but a prisoner handcuffed to his jailer. Both men were chained. If Fowler left him alone for too long, Norman might recover. It was the inevitable menace that made travel impossible. Fowler could keep no servants; he lived alone with his prisoner. Occasionally he thought of Norman as a venomous snake whose poison fangs had to be removed each time they were renewed. He dared not cut out the poison sacs themselves, for there was no way to do that without killing the golden goose. The mixed metaphors were indicative of the state of Fowler's mind by then.

And he was almost as much a



prisoner in the house as Norman was.

Constantly now he had to set Norman problems to solve simply as a safety measure, whether or not they had commercial value. For Norman was slowly regaining his strength. He was never completely coherent, but he could talk a little more, and he managed to put across quite definitely his tremendous urge to give Fowler certain obscure information.

Fowler knew, of course, what it probably was. The cure. And Norman seemed to have a strangely touching confidence that if he could only frame his message intelligibly, Fowler would make arrangements for the mysterious cure.

Once Fowler might have been touched by the confidence. Not now. Because he was exploiting Norman so ruthlessly, he had to hate either Norman or himself. By a familiar process he was projecting his own fault upon his prisoner and punishing Norman for it. He no longer speculated upon Norman's myster-

ious origin or the source of his equally mysterious powers. There was obviously something in that clouded mind that gave forth flashes of a certain peculiar genius. Fowler accepted the fact and used it.

There was probably some set of rules that would govern what Norman could and could not do, but Fowler did not discover—until it was too late—what the rules were. Norman could produce inconceivably intricate successes, and then fail dismally at the simplest tasks.

Curiously, he turned out to be an almost infallible finder of lost articles, so long as they were lost in the confines of the house. Fowler discovered this by accident, and was gratified to learn that for some reason that kind of search was the most exhausting task he could set for his prisoner. When all else failed, and Norman still seemed too coherent or too strong for safekeeping, Fowler had only to remember that he had misplaced his wristwatch or a book or screwdriver, and to send Norman after it.

Then something very odd happened, and after that he stopped the practice, feeling bewildered and insecure. He had ordered Norman to find a lost folder of rather important papers. Norman had gone into his own room and closed the door. He was missing for a long time. Eventually Fowler's impatience built up enough to make him call off the search, and he shouted to Norman to come out.

There was no answer. When he

had called a third time in vain, Fowler opened the door and looked in. The room was empty. There were no windows. The door was the only exit, and Fowler could have sworn Norman had not come out of it.

In a rising panic he ransacked the room, calling futilely. He went through the rest of the house in a fury of haste and growing terror. Norman was not in the kitchen or the living room or the cellar or anywhere in sight outside.

Fowler was on the verge of a nervous collapse when Norman's door opened and the missing man emerged, staggering a little, his face white and blank with exhaustion, and the folder of papers in his hand.

He slept for three days afterward. And Fowler never again used that method of keeping his prisoner in check.

After six uneventful months had passed Fowler put Norman to work on a supplementary device that might augment the Barnaby magic window. He was receiving reports from a bribed daily maid, and he took pains to hear all the gossip mutual friends were happy to pass on. The Barnaby marriage appeared to suffer from a higher than normal percentage of spats and disagreements, but so far it still held. The magic window was not enough.

Norman turned out a little gadget that produced supersonics guaranteed to evoke irritability and nervous tension. The maid smuggled it into the apartment. Thereafter, the re-

ports Fowler received were more satisfactory, from his point of view.

All in all, it took three years.

And the thing that finally turned the trick was the lighting gadget which Fowler had conceived in that bar interlude when Veronica first told him about Barnaby.

Norman worked on the fixtures for some time. They were subtle. The exact tinting involved a careful study of Veronica's skin tones, the colors of the apartment, the window placement. Norman had a scale model of the rooms where the Barnabys were working out their squabbles toward divorce. He took a long time to choose just what angles of lighting he would need to produce the worst possible result. And of course it all had to be done with considerable care because the existing light fixtures couldn't be changed noticeably.

With the help of the maid, the job was finally done. And thereafter, Veronica in her own home was—ugly.

The lights made her look haggard. They brought out every line of fatigue and ill-nature that lurked anywhere in her face. They made her sallow. They caused Barnaby increasingly to wonder why he had ever thought the girl attractive.

"It's your fault!" Veronica said hysterically. "It's all your fault and you know it!"

"How could it be my fault?" Fowler demanded in a smug voice, trying hard to iron out the smile that

kept pulling up the corners of his mouth.

The television screen was between them like a window. Veronica leaned toward it, the cords in her neck standing out as she shouted at him. He had never seen that particular phenomenon before. Probably she had acquired much practice in angry shouting in the past three years. There were thin vertical creases between her brows that were new to him, too. He had seen her face to face only a few times in the years of her marriage. It had been safer and pleasanter to create her in the magic window when he felt the need of seeing her.

This was a different face, almost a different woman. He wondered briefly if he was watching the effect of his own disenchanting lighting system, but a glimpse beyond her head of a crowded drugstore assured him that he was not. This was real, not illusory. This was a Veronica he and Norman had, in effect created.

"You did it!" Veronica said, accusingly. "I don't know how, but you did it."

Fowler glanced down at the morning paper he had just been reading, folded back to the gossip column that announced last night's spectacular public quarrel between a popular Korys model and her broker husband.

"What really happened?" Fowler asked mildly.

"None of your business," Veronica told him with fine illogic.

"You ought to know! You were behind it—you know you were! You and that half-wit of yours, that Norman. You think I don't know? With all those fool inventions you two work out, I know perfectly well you must have done *something*—"

"Veronica, you're raving."

She was, of course. It was sheer hysteria, plus her normal conviction that no unpleasant thing that happened to her could possibly be her own fault. By pure accident she had hit upon the truth, but that was beside the point.

"Has he left you? Is that it?" Fowler demanded.

She gave him a look of hatred. But she nodded. "It's your fault and you've got to help me. I need money. I—"

"All right, all right! You're hysterical, but I'll help you. Where are you? I'll pick you up and we'll have a drink and talk things over. You're better off than you know, baby. He never was the man for you. You haven't got a thing to worry about. I'll be there in half an hour and we can pick up where we left off three years ago."

Part of what he implied was true enough, he reflected as he switched off the television screen. Curiously, he still meant to marry her. The changed face with its querulous lines and corded throat repelled him, but you don't argue with an obsession. He had worked three years toward this moment, and he still meant to marry Veronica Barnaby as he had originally meant to marry Veronica

Wood. Afterward—well, things might be different.

One thing frightened him. She was not quite as stupid as he had gambled on that day years ago when he had been forced to call on her for help with Norman. She had seen too much, deduced too much—remembered much too much. She might be dangerous. He would have to find out just what she thought she knew about him and Norman.

It might be necessary to silence her, in one way or another.

Norman said with painful distinctness: "Must tell you . . . *must*—"

"No, Norman." Fowler spoke hastily. "We have a job to do. There isn't time now to discuss—"

"Can't work," Norman said. "No . . . *must* tell you—" He paused, lifted a shaking hand to his eyes, grimacing against his own palm with a look of terrible effort and entreaty. The strength that was mysteriously returning to him at intervals now had made him almost a human being again. The blankness of his face flooded sometimes with almost recognizable individuality.

"Not yet, Norman!" Fowler heard the alarm in his own voice. "I need you. Later we'll work out whatever it is you're trying to say. Not now. I . . . look, we've got to reverse that lighting system we made for Veronica. I want a set of lights that will flatter her. I need it in a hurry, Norman. You'll have to get to work on it right away."

Norman looked at him with hollow eyes. Fowler didn't like it. He would not meet the look. He focused on Norman's forehead as he repeated his instructions in a patient voice.

Behind that colorless forehead the being that was Norman must be hammering against its prison walls of bone, striving hard to escape. Fowler shook off the fanciful idea in distaste, repeated his orders once more and left the house in some haste. Veronica would be waiting.

But the look in Norman's eyes haunted him all the way into the city. Dark, hollow, desperate. The prisoner in the skull, shut into a claustrophobic cell out of which no sound could carry. He was getting dangerously strong, that prisoner. It would be a mercy in the long run if some task were set to exhaust him, throw him back into that catatonic state in which he no longer knew he was in prison.

Veronica was not there. He waited for an hour in the bar. Then he called her apartment, and got no answer. He tried his own house, and no one seemed to be there either. With unreasonably mounting uneasiness, he went home at last.

She met him at the door.

"Veronica! I waited for an hour! What's the idea?"

She only smiled at him. There was an almost frightening triumph in the smile, but she did not speak a word.

Fowler pushed past her, fighting

his own sinking sensation of alarm. He called for Norman almost automatically, as if his unconscious mind recognized before the conscious knew just what the worst danger might be. For Veronica might be stupid but he had perhaps forgotten how cunning the stupid sometimes are. Veronica could put two and two together very well. She could reason from cause to effect quite efficiently, when her own welfare was at stake.

She had reasoned extremely well today.

Norman lay on the bed in his windowless room, his face as blank as paper. Some effort of the mind and will had exhausted him out of all semblance to a rational being. Some new, some overwhelming task, set him by—Veronica? Not by Fowler. The job he had been working on an hour ago was no such killing job as this.

But would Norman obey anyone except Fowler? He had defied Veronica on that other occasion when she tried to give him orders. He had almost escaped before Fowler's commanding voice ordered him back. Wait, though—she had coaxed him. Fowler remembered now. She could not command, but she had coaxed the blank creature into obedience. So there was a way. And she knew it.

But what had the task been?

With long strides Fowler went back into the drop-shaped living room. Veronica stood in the door-

way where he had left her. She was waiting.

"What did you do?" he demanded.

She smiled. She said nothing at all.

"What happened?" Fowler cried urgently. "Veronica, answer me! What did you do?"

"I talked to Norman," she said. "I . . . got him to do a little job for me. That was all. Good-by, John."

"Wait! You can't leave like that. I've got to know what happened. I—"

"You'll find out," Veronica said. She gave him that thin smile again and then the door closed behind her. He heard her heels click once or twice on the walk and she was gone. There was nothing he could do about it.

He didn't know what she had accomplished. That was the terrifying thing. She had talked to Norman—And Norman had been in an almost coherent mood today. If she asked the right questions, she could have learned—almost anything. About the magic window and the super-sonics and the lighting. About Norman himself. About—even about a weapon she could use against Fowler. Norman would make one if he were told to. He was an automaton. He could not reason; he could only comply.

Perhaps she had a weapon, then. But what? Fowler knew nothing at all of Veronica's mind. He had no idea what sort of revenge she might take if she had a field as limit-

less as Norman's talents offered her. Fowler had never been interested in Veronica's mind at all. He had no idea what sort of being crouched there behind her forehead as the prisoner crouched behind Norman's. He only knew that it would have a thin smile and that it hated him.

"You'll find out," Veronica had said. But it was several days before he did, and even then he could not be sure. So many things could have been accidental. Although he tried desperately he could not find Veronica anywhere in the city. But he kept thinking her eyes were on him, that if he could turn quickly enough he would catch her staring.

"That's what makes voodoo magic work," he told himself savagely. "A man can scare himself to death, once he knows he's been threatened—"

Death, of course, had nothing to do with it. Clearly it was no part of her plan that her enemy should die—and escape her. She knew what Fowler would hate most—ridicule.

Perhaps the things that kept happening were accidents. The time he tripped over nothing and did a foolishly clownish fall for the amusement of a long line of people waiting before a ticket window. His ears burned whenever he remembered that. Or the time he had three embarrassing slips of the tongue in a row when he was trying to make a good impression on a congressman and his pompous wife in connection with a patent. Or the time in the Biltmore dining room when he

dropped every dish or glass he touched, until the whole room was staring at him and the headwaiter was clearly of two minds about throwing him out.

It was like a perpetual time bomb. He never knew what would happen next, or when or where. And it was certainly sheer imagination that made him think he could hear Veronica's clear, high, ironic laughter whenever his own body betrayed him into one of these ridiculous series of slips.

He tried shaking the truth out of Norman.

"What did you do?" he demanded of the blank, speechless face. "What did she make you do? Is there something wrong with my synapses now? Did you rig up something that would throw me out of control whenever she wants me to? *What did you do, Norman?*"

But Norman could not tell him.

On the third day she televised the house. Fowler went limp with relief when he saw her features taking shape in the screen. But before he could speak she said sharply: "All right, John. I only have a minute to waste on you. I just wanted you to know I'm *really* going to start to work on you beginning next week. That's all, John. Good-by."

The screen would not make her face form again no matter how sharply he rapped on it, no matter how furiously he jabbed the buttons to call her back. After awhile he relaxed limply in his chair and sat

staring blankly at the wall. And now he began to be afraid—

It had been a long time since Fowler faced a crisis in which he could not turn to Norman for help. And Norman was no use to him now. He could not or would not produce a device that Fowler could use as protection against the nameless threat. He could give him no inkling of what weapon he had put in Veronica's hand.

It might be a bluff. Fowler could not risk it. He had changed a great deal in three years, far more than he had realized until this crisis arose. There had been a time when his mind was flexible enough to assess dangers coolly and resourceful enough to produce alternative measures to meet them. But not any more. He had depended too long on Norman to solve all his problems for him. Now he was helpless. Unless—

He glanced again at that stunning alternative and then glanced mentally away, impatient, knowing it for an impossibility. He had thought of it often in the past week, but of course it couldn't be done. Of course—

He got up and went into the windowless room where Norman sat quietly, staring at nothing. He leaned against the door frame and looked at Norman. There in that shuttered skull lay a secret more precious than any miracle Norman had yet produced. The brain, the mind, the source. The mysterious quirk that brought forth golden eggs.

"There's a part of your brain in use that normal brains don't have," Fowler said thoughtfully aloud. Norman did not stir. "Maybe you're a freak. Maybe you're a mutation. But there's something like a thermostat in your head. When it's activated, your mind's activated, too. You don't use the same brain-centers I do. You're an idling motor. When the supercharger cuts in *something* begins to work along lines of logic I don't understand. I see the result, but I don't know what the method is. If I could know that—"

He paused and stared piercingly at the bent head. "If I could only get that secret out of you, Norman! It's no good to you. But there isn't any limit to what I could do with it if I had your secret and my own brain."

If Norman heard he made no motion to show it. But some impulse suddenly goaded Fowler to action. "I'll do it!" he declared. "I'll try it! What have I got to lose, anyhow? I'm a prisoner here as long as this goes on, and Norman's no good to me the way things stand. It's worth a try."

He shook the silent man by the shoulder. "Norman, wake up. Wake up, wake up, wake up. Norman, do you hear me? Wake up, Norman, we have work to do."

Slowly, out of infinite distances, the prisoner returned to his cell, crept forward in the bone cage of the skull and looked dully at Fowler out of deep sockets.

And Fowler was seized with a sudden, immense astonishment that until now he had never really considered this most obvious of courses. Norman could do it. He was quite confident of that, suddenly. Norman could and must do it. This was the point toward which they had both been moving ever since Norman first rang the doorbell years ago. It had taken Veronica and a crisis to make the thing real. But now was the time—time and past time for the final miracle.

Fowler was going to become sufficient unto himself.

"You're going to get a nice long rest, Norman," he said kindly. "You're going to help me learn to . . . to think the way you think. Do you understand, Norman? Do you know what it is that makes your brain work the way it does? I want you to help my brain think that way, too. Afterward, you can rest, Norman. A nice, long rest. I won't be needing you any more after that, Norman."

Norman worked for twenty-four hours without a break. Watching him, forcing down the rising excitement in his mind, Fowler thought the blank man too seemed overwrought at this last and perhaps greatest of all his tasks. He mumbled a good deal over the intricate wiring of the thing he was twisting together. It looked rather like a tesseract, an open, interlocking framework which Norman handled with great care. From time to time

he looked up and seemed to want to talk, to protest. Fowler ordered him sternly back to his task.

When it was finished it looked a little like the sort of turban a sultan might wear. It even had a jewel set in the front, like a headlight, except that this jewel really was light. All the wires came together there, and out of nowhere the bluish radiance sprang, shimmering softly in its little nest of wiring just above the forehead. It made Fowler think of an eye gently opening and closing. A thoughtful eye that looked up at him from between Norman's hands.

At the last moment Norman hesitated. His face was gray with exhaustion as he bent above Fowler, holding out the turban. Like Charlemagne, Fowler reached impatiently for the thing and set it on his own head. Norman bent reluctantly to adjust it.

There was a singing moment of anticipation—

The turban was feather-light on his head, but wherever it touched it made his scalp ache a bit, as if every hair had been pulled the wrong way. The aching grew. It wasn't only the hair that was going the wrong way, he realized suddenly—

It wasn't only his hair, but his mind—

It wasn't only—

Out of the wrenching blur that swallowed up the room he saw Norman's anxious face take shape, leaning close. He felt the crown of wire lifted from his head. Through a

violent, blinding ache he watched Norman grimace with bewilderment.

"No," Norman said. "No . . . wrong . . . *you* . . . wrong—"

"I'm wrong?" Fowler shook his head a little and the pain subsided, but not the feeling of singing anticipation, nor the impatient disappointment at this delay. Any moment now might bring some interruption, might even bring some new, unguessable threat from Veronica that could ruin everything.

"What's wrong?" he asked, schooling himself to patience. "Me? How am I wrong, Norman? Didn't anything happen?"

"No. Wrong . . . *you*—"

"Wait, now." Fowler had had to help work out problems like this before. "O.K., I'm wrong. How?" He glanced around the room. "Wrong room?" he suggested at random. "Wrong chair? Wrong wiring? Do I have to co-operate somehow?" The last question seemed to strike a response. "Co-operate how? Do you need help with the wiring? Do I have to do something after the helmet's on?"

"Think!" Norman said violently.

"I have to think?"

"No. Wrong, wrong. Think wrong."

"I'm thinking wrong?"

Norman made a gesture of despair and turned away toward his room, carrying the wire turban with him.

Fowler, rubbing his forehead where the wires had pressed, wondered dizzily what had happened.

Think wrong. It didn't make sense. He looked at himself in the television screen, which was a mirror when not in use, fingered the red line of the turban's pressure, and murmured, "Thinking, something to do with thinking. What?" Apparently the turban was designed to alter his patterns of thought, to open up some dazzling door through which he could perceive the new causalities that guided Norman's mind.

He thought that in some way it was probably connected with that moment when the helmet had seemed to wrench first his hair and then his skull and then his innermost thoughts in the wrong direction. But he couldn't work it out. He was too tired. All the emotional strain of the past days, the menace still hanging over him, the tremulous excitement of what lay in the immediate future—no, he couldn't be expected to reason things through very clearly just now. It was Norman's job. Norman would have to solve that problem for them both.

Norman did. He came out of his room in a few minutes, carrying the turban, twisted now into a higher, rounder shape, the gem of light glowing bluer than before. He approached Fowler with a firm step.

"You . . . thinking wrong," he said with great distinctness. "Too . . . too old. Can't change. Think wrong!"

He stared anxiously at Fowler and Fowler stared back, searching the deep-set eyes for some clue to

the meaning hidden in the locked chambers of the skull behind them.

"Thinking wrong." Fowler echoed. "Too . . . old? I don't understand. Or—do I? You mean my mind isn't flexible enough any more?" He remembered the wrenching moment when every mental process had tried vainly to turn sidewise in his head. "But then it won't work at all!"

"Oh, yes," Norman said confidently.

"But if I'm too old—" It wasn't age, really. Fowler was not old in years. But the grooves of his thinking had worn themselves deep in the past years since Norman came. He had fixed inflexibly in the paths of his own self-indulgence and now his mind could not accept

the answer the wire turban offered. "I can't change," he told Norman despairingly. "If I'd only made you do this when you first came, before my mind set in its pattern—"

Norman held out the turban, reversed so that the blue light bathed his face in blinking radiance. "This—will work," he said confidently.

Belated caution made Fowler dodge back a little. "Now wait. I want to know more before we . . . how *can* it work? You can't make me any younger, and I don't want any random tampering with my brain. I—"

Norman was not listening. With a swift, sure gesture he pressed the wired wreath down on Fowler's head.

There was the wrenching of hair



and scalp, skull and brain. This first—and then very swiftly the shadows moved upon the floor, the sun gleamed for one moment through the eastern windows and the world darkened outside. The darkness winked and was purple, was dull red, was daylight—

Fowler could not stir. He tried furiously to snatch the turban from his head, but no impulse from his brain made any connection with the motionless limbs. He still stood facing the mirror, the blue light still winked thoughtfully back at him, but everything moved so fast he had no time to comprehend light or dark for what they were, or the blurred motions reflected in the glass, or what was happening to him.

This was yesterday, and the week before, and the year before, but he did not clearly know it. *You can't make me any younger.* Very dimly he remembered having said that to Norman at some remote interval of time. His thoughts moved sluggishly somewhere at the very core of his brain, whose outer layers were being peeled off one by one, hour by hour, day by day. But Norman could make him younger. Norman *was* making him younger. Norman was whisking him back and back toward the moment when his brain would regain flexibility enough for the magical turban to open that door to genius.

Those blurs in the mirror were people moving at normal time-speed—himself, Norman, Veronica going forward in time as he slipped back-

ward through it, neither perceiving the other. But twice he saw Norman moving through the room at a speed that matched his own, walking slowly and looking for something. He saw him search behind a chair-cushion and pull out a creased folder, legal size—the folder he had last sent Norman to find, on that day when he vanished from his closed room!

Norman, then, had traveled in time before. Norman's powers must be more far-reaching, more dazzling, than he had ever guessed. As his own powers would be, when his mind cleared again and this blinding flicker stopped.

Night and day went by like the flapping of a black wing. That was the way Wells had put it. That was the way it looked. A hypnotic flapping. It left him dazed and dull—

Norman, holding the folder, lifted his head and for one instant looked Fowler in the face in the glass. Then he turned and went away through time to another meeting in another interval that would lead backward again to this meeting, and on and on around a closing spiral which no mind could fully comprehend. It didn't matter. Only one thing really mattered. Fowler stood there shocked for an instant into almost total wakefulness, staring at his own face in the mirror, remembering Norman's face.

For one timeless moment, while night and day flapped around him, he stood helpless, motionless, staring appalled at his reflection in the gray

that was the blending of time—and he knew who Norman was.

Then mercifully the hypnosis took over again and he knew nothing at all.

There are centers in the brain never meant for man's use today. Not until the race has evolved the strength to handle them. A man of today might learn the secret that would unlock those centers, and if he were a fool he might even turn the key that would let the door swing open.

But after that he would do nothing at all of his own volition.

For modern man is still too weak to handle the terrible energy that must pour forth to activate those centers. The grossly overloaded physical and mental connections could hold for only a fraction of a second. Then the energy flooding into the newly unlocked brain-center never meant for use until perhaps a thousand more years have remodeled mankind, would collapse the channels, fuse the connections, make every synapse falter in the moment when the gates of the mind swing wide.

On Fowler's head the turban of wires glowed incandescent and vanished. The thing that had once happened to Norman happened now to him. The dazzling revelation—the draining, the atrophy—

He had recognized Norman's face reflected in the mirror beside his own, both white with exhaustion, both stunned and empty. He knew

who Norman was, what motives moved him, what corroding irony had made his punishing of Norman just. But by the time he knew, it was already far too late to alter the future or the past.

Time flapped its wings more slowly. That moment of times gone swung round again as the circle came to its close. Memories flickered more and more dimly in Fowler's mind, like day and night, like the vague, shapeless world which was all he could perceive now. He felt cold and weak, strangely, intolerably, inhumanly weak with a weakness of the blood and bone, of the mind and soul. He saw his surroundings dimly, but he saw—other things—with a swimming clarity that had no meaning to him. He saw causes and effects as tangible before him as he had once seen trees and grass. But remote, indifferent, part of another world.

Help was what he needed. There was something he must remember. Something of terrible import. He must find help, to focus his mind upon the things that would work his cure. Cure was possible; he knew it—he knew it. But he needed help.

Somehow there was a door before him. He reached vaguely, moving his hand almost by reflex toward his pocket. But he had no pocket. This was a suit of the new fashion, sleek in fabric, cut without pockets. He would have to knock, to ring. He remembered—

The face he had seen in the mir-

ror. His own face? But even then it had been changing, as a cloud before the sun drains life and color and soul from a landscape. The expunging amnesia wiped across its mind had had its parallel physically, too; the traumatic shock of moving through time—the *dark wing flapping*—had sponged the recognizable characteristics from his face, leaving the matrix, the characterless basic. This was not his face. He had no face; he had no memory. He knew

only that this familiar door before him was the door to the help he must have to save himself from a circling eternity.

It was almost wholly a reflex gesture that moved his finger toward the doorbell. The last dregs of memory and initiative drained from him with the motion.

Again the chimes played three soft notes. Again the circle closed.

Again the blank man waited for John Fowler to open the door.

THE END

IN TIMES TO COME

Next month's cover will be another symbolic cover by Alejandro. Rather an interesting idea, done simply and boldly. I believe you'll like it. And I know you'll like Wilmar Shiras' second story, "Opening Doors," a sequel to "In Hiding." Tim was lucky; he succeeded in adjusting, and the particular nature of his grandmother, and her way of instruction, was such as to actually show him the path to adjustment. Tim made it. But you know, it wouldn't be easy for the kids like Tim to make that adjustment; some of them must have been "spoiled in the making." And there would, indeed, be work for Dr. Peter Welles' psychiatric services. And there, too, lies the story of "Opening Doors."

Also coming up is a story by Hal Clement called "Fireproof." This yarn involves a very simple little principle of spaceship operation and space-conditions which has been completely overlooked by all the years of science-fiction writing. It's a simple, but beautiful idea—beautifully logical, and overlooked because of its simplicity. The saboteur trained in the art missed the point too—with fatal results. Good yarn, as well as a good idea, of course; Hal Clement hasn't appeared as often as we wish, but his stories are worth while.

Clement, by the way, was a bomber pilot during the war; I was amused to discover, on meeting him again after VJ Day, that Hal couldn't drive a car—he'd never learned how. He was having trouble learning too—when he saw an obstruction ahead he had a tendency to pull back on the wheel and try to soar over. Two dimensions cramped his style, after learning manipulation of strictly three-dimensional motor vehicles first!

THE EDITOR.



NEXT FRIDAY MORNING

BY D. W. MEREDITH

Which really has to do mainly with the peculiar fate of a common kitchen utensil.

Illustrated by Orban

The phone—it was an old-fashioned, strictly, utilitarian model without so much as a vision screen to call its own—lacked any resemblance to an instrument of doom. There is something horrible about a

machine that turns on its creators—the ship gliding with studied indifference toward the barely submerged reef, the aircraft suddenly wreathed with flames, the radio that hesitates in the middle of a com-

mercial and blurts out a message of disaster. It is even worse when the pattern is so obscure that the buried instinct has no warning, no reason to cry: "I knew it! I knew it!"

Professor John Harley was in bed, deep in the symbolic algebra of Hogben's genetics equations, when the phone rang just before midnight. With a resigned sigh he placed his book on a night table and put the instrument to his ear.

"Hello?"

"Hello! Professor Harley?"

The voice cracked with excitement. "This is Walter Symonds. We've done it, professor, we've done it!"

"That's very interesting, Walter," the professor answered dryly, "and I'm extremely glad to hear it. However, if it isn't asking too much, just what have you done, and is your 'we' editorial, or are you still working with your collaborator?"

"We've effected a temporal displacement of mass, Ortega and I." Symonds' voice was lower, but still jerky and strained in marked contrast to his usual calm. "It's absolutely clean-cut! We sent ten cubic centimeters of silver fifteen seconds into the future, and stood there and watched it materialize when the time had elapsed. Ortega's math was right after all. Professor, can you come over?"

"Well, Walter, I'm in bed—"

"Come on, professor, you can dress in five minutes, and drive over in an hour. This is *big*. The Berkeley gang will have to eat crow now, and no mistake."

"I'll be there as soon as I can, Walter," the professor said, and hung up. Time-travel, he thought incredulously. His rickety heart kept pace with his mounting excitement, and he forced himself to relax for a few minutes. Then he dressed slowly, got out his car, and drove through Berkeley toward the San Francisco Tunnel. As the miles dropped away he reviewed with honest admiration the professional careers of the two remarkable men he was about to see.

Walter Symonds was a product of M.I.T. At independent research he lit no enduring fires, but once given a set of rough specifications, and material with which to work, results were his forte. His achievements with General Electric were legend wherever electronics or atomic engineers foregathered. When the American Atomic Authority financed construction of the neutrino laboratory at Berkeley in 1960, Symonds had no competitors for the superintendency. He was tops in his field.

At Berkeley he met Joseph Ortega, who was variously acclaimed as a genius and denounced as a quack. Ortega's father was a day laborer, and Joe had got most of his early education on Main Street in Los Angeles. Back in the days before World War II he entered a trade school for a course in aircraft template layout, with a view to acquiring a position paying the munificent wage of fifty cents an hour. To his utter horror, he found that

he was supposed to have a working knowledge of a thing called trigonometry. Completely unaware of his latent mathematical ability, he bought a textbook in a secondhand store, and mastered the fundamentals in a week. That started it. He knew trigonometry before he studied geometry. Then, in rapid succession, came algebra, calculus, Cartesian equations, logarithms—all the basics. Techniques that the average university student takes for granted were to him a never ending source of wonder. In 1941 he innocently took to the printer a manuscript entitled: "A Statistical Analysis of Nuclear Cross Sections." Of course, it was promptly censored out of existence, but not before it brought him to the attention of the Manhattan Project, where he did valuable work on resonance mechanics. In 1959 he published the Ortega S-Field Equations, which provoked a storm of controversy. In 1960 came the historic meeting with Symonds and a year later the two of them, working in the Marin County Laboratory, isolated the graviton. A pair of very smart boys.

It was after one o'clock when Professor Harley parked his car in the driveway and walked past Symonds' neat little ranch-type home toward the cement block laboratory. The lights of Mill Valley shone in the lower distance, and the night air was heavy with the scent of flowers.

At his knock the door was flung open by a short, little man resem-

bling a cross between a dynamo and a French poodle. Professor Harley found himself clasped in a fervent embrace and inundated by a torrent of words.

"Welcome, John, welcome, my Juano. Ah, come in, come in! Why were you not here? It was glorious. History we have made tonight! History!—and you in bed, dreaming of a procession of generations."

This was Ortega. Behind him, big, blond Symonds was choking with laughter. The professor gently disengaged himself.

"Are you sure you and Walt haven't been dreaming, Joe? I want to see an example of temporal displacement before I commit myself. Proof before applause, you know."

"Proof my Juano, proof? You shall have it in full measure, pressed down, and overflowing. When we—"

Still smiling, Symonds interrupted. "In about one minute, Joe, *you're* going to be pressed down. We'll give you a demonstration, professor. As for applause, I know I'm going to be too busy finding out things about all the time-travel paradoxes that have been plaguing the theory boys."

"Like slipping ahead fifty years to see if your grandson makes Phi Beta Kappa?"

"That's it. Or next year's Derby winner, say. Well, come on and be convinced."

He led the way across the room. The professor followed and Ortega skipped happily along in the rear.

The mechanism was deceptively simple. Professor Harley looked at the innocuous assortment of tubes and condensers and wiring, at the everyday power leads, at the little insulated dais with the crystal loop around it.

"It doesn't look very involved," he said doubtfully.

Ortega let out a screech. "Involved! Involved? Ah, Juano, if you but knew—"

"There was nothing uncomplicated about the math." Symonds' voice was a cool shower. "The principle is simple, though. Dunnes' hunch was right, the old slit-in-time idea. Watch."

Unhurriedly, he took from his pocket a little plush jeweler's box and from the box a tiny silver cube. He placed the cube on the dais, glanced at the dials on the little instrument panel, and flipped a switch. Professor Harley's eyes were riveted on the silver cube.

"Takes a minute to warm up," said Symonds quietly.

The crystal loop was shimmering with violet light. Then, briefly, the silver had an aura of its own. The cube was wavering, flickering. It vanished.

Professor Harley's hands were clenched and his heart was thumping in an alarming way, but he didn't notice.

"It's still set for fifteen seconds," said Symonds detachedly. "There!"

The cube was back. Symonds switched off the power.

"Now it's parallel with the slit

through which we observe—our 'now'," he said. "Later, I'll make the jump myself, see things from the viewpoint of a different 'now'. Hey, pal, relax. It's bad enough to nurse Joe through periodic hysterics without you folding up. Take it easy."

The professor smiled and lit a cigarette.

"It was just a little overwhelming, Walt."

"You're not just kidding. It got me that way the first time, and you should have seen poor Joe. He all but tried to walk up the wall."

"I don't blame him," said Professor Harley. "What's your present limit on this thing?"

"Half a minute, but it'll be more tomorrow. I can increase the windings on the coil that produces the primary field and get a limit of seven or eight days for a kilogram or so of mass."

The professor was frowning. "Walt, the material actually exists in a real future?"

"Yes."

"What if someone interferes with it?"

Symonds chuckled. "There's a very neat answer to that. The field exists four-dimensionally, and the temporally displaced object is still in it. Any disturbance causes a potential drop that actuates a relay right here—'now'—that brings it back in a hurry. It's foolproof."

"Clever," said the professor admiringly.

"Applause noted," said Symonds. He yawned. "I'm bushed. We've

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been working pretty steadily for three days. How about a bite to eat before I crawl into bed and die?"

The professor agreed. Half an hour later the three men were seated around a card table and disposing of scrambled eggs and toast while coffee bubbled in the percolator on the lab hot plate.

They finished the meal and lit cigarettes before anyone spoke. Symonds started the conversation.

"Well, professor, what news from the outside world?"

Professor Harley studied his glowing cigarette. "There's a Pan-American conference on soil erosion being planned. They're holding it at Rio. Interested?"

"The century of the conference table manufacturer," laughed Symonds. "No wonder our forests are disappearing. What else?"

"Double talk about a general strike in New York sometime next month."

Symonds frowned. "That'll mean the National Guard and the Industrial Mobilization Corps will be throwing their weight around. How lovely. Well, there's nothing we can do except sign petitions. Continue."

"One more thing," said the professor, "Washington announced last night that on the fourteenth—next Friday morning—the Army will fire a space torpedo with a fermium war head into the center of Kwadjelein atoll."

He was surprised at the reaction. Symonds turned white and stared

incredulously. Ortega made a noise between a screech and a moan, and then burst into speech.

"Juano, no! It may be—who knows?—the finish. I have made figures—there is danger. Cannot they tell? Fools! Idiots!"

The professor cut him off. "Go slower, Joe. Try to make sense." He turned to Symonds. "What's he talking about?"

Symonds shook his head. "It's his department, not mine." He caught Ortega by the shoulder. "Take it easy, Joe, for Pete's sake. Pretend you're speaking to the Berkeley faculty, ah?"

Ortega subsided a little. "I have separated some fermium—that's 101FM244—with the mass spectrograph. Juano, you know what is the k factor?"

The professor shook his head.

"If one hundred free neutrons in an atomic reaction produce fissions causing one hundred one free neutrons, there will be a chain reaction. K will equal one point oh one. You understand? If the K factor is greater than unity, the reaction is self propagating; if less, it damps out. In fermium, my Juano, it is too high to take chances. So is the mass difference, one of the basic terms of the Einstein formula that lies back of it all. It is clear now?"

The professor looked doubtful. "Well . . . yes, in a general way. I'm sorry if I don't seem too bright, but—"

"Ah, no Juano," protested Ortega. "Atomics is not your field."

Do I know how many spotted pigs come from a white grandma and a brown grandpa? I do not, nor do I care. But this bomb. That I know. That I fear."

"But Joe, surely the A.A.A. would know if there's any chances of starting that . . . er . . . carbon nitrogen cycle." Now where did I get that, he thought.

"The Bethe-Weizsäcker reaction? Poof! Any reaction bomb can do that. It damps out. This could start a reaction in the crust of the planet. Finish."

"He's probably right," said Symonds, with gloomy pride. "He juggles gram calories and mass units back and forth the way most people handle feet and inches. Better, in fact." He smiled somberly. "Just last week I overheard some woman insisting that two-eighths make a sixteenth."

"Well," said the professor helplessly, "what do we do to get a postponement of the test? Write our congressmen? That sounds silly, but I can't think of a thing."

"Not enough time anyway," said Symonds. "This is Wednesday night—I mean Thursday morning. Hey! I've got it!" He gulped. "Professor, wasn't President Howard in one of your classes when he was attending the University? Yes? O.K.! He's known to be approachable by old friends, and you'll just have to qualify. Come morning call him long distance. Get that test delayed!"

Professor Harley blinked. "I

couldn't do that. Anyway, I'm a geneticist. Why don't you do it? You've got ample prestige in the field."

"Sure I have and my mother's name was Simkhovich, too. Think what the Subversive Activities Committee would do with *that*. Professor, you've *got* to do it."

"All right, Walter," said Professor Harley quietly. "You win, I yield. But after all, I'll have to tell the President that my information comes from you and Joe. And now, hadn't we better get some sleep? Morning isn't far away."

Symonds and Ortega waited silently. They could hear the murmur of the professor's voice inside, though the words were indistinguishable. It seemed a long time before he came out, beaming, and answered the unspoken question.

"The President will ask the Military Affairs Committee to hold up the test for a recheck of the known data. There will be an announcement later today," he said.

Symonds and Ortega looked at him and then at each other, and suddenly the tension was gone.

"He spoke highly of you—both of you," the professor added. "Have I earned my breakfast?"

It was generally acknowledged that he had, and they ate in the shaded little patio. Joan Symonds, Walter's dark and attractive wife, served them grapefruit, a mushroom omelette, toast, and coffee, and chaffed them indiscriminately.

"This levity," said Symonds with mock severity. "Have you no respect for your distinguished guest?"

The professor raised his hand in a restraining gesture. "After that breakfast, Walt, she's entitled to throw rocks at us if she wants."

Joan curtsied. "Thank you, sir. Don't let Walter fool you. He often says nice things to me, really. 'Gee, Joan, that's good cake', or 'you made the bed nicely, dear', or, 'you made the bed'."

She fled with an armful of dishes before Symonds could frame a retort. He smiled fondly after her.

The day passed quietly. At three o'clock a special delivery package arrived—parts built to specifications for the little machine in the lab. Symonds disappeared with his bundle, declining offers of help. The professor and Ortega chatted in the cool, little patio. They tacitly avoided the subject of atomics.

The battered press car pulled into the drive just before dusk. Ortega noted the lettering on the car door—"San Francisco *CHRONICLE*"—and sighed. He rose to his feet as two men piled out and hurried toward the patio, one of them a dark, slender youngster, slightly in advance of the other. The second man carried a camera.

"Yes, gentlemen?" said Ortega.

"You're Ortega, aren't you?" said the youngster. He went on almost without hesitation as Ortega nodded. "It'll be on the air any minute now, but I'll give it to you straight. The House Military Affairs Committee

has protested against postponement of the fermium bomb test, and the Subversive Activities Committee wants you and Mr. Symonds and Professor Harley to attend a Washington hearing next week. The test will be held tomorrow, Mr. Ortega. Would you mind stating if it is true that your father was a revolutionary in Mexico?"

Ortega swelled with rage. "He was a picker of sugar beets and a simple man, never a politician." He flinched as a flash bulb exploded almost in his face.

"It is true that you have advocated nationalization of steel, railroads, and mines?" said the *Chronicle* reporter.

"And if so, what of it?" asked Symond's tired voice. He had approached unheard.

"Mr. Symonds, I'd like to ask you something. No offense intended. Was your mother's maiden name Simkhovich, and did you at M.I.T. room with a chap named Igor Protipoff?"

Before Symonds could answer another car pulled in. "*Examiner*" said the lettering on the door. Symonds blinked.

"Might as well wait for the others and have a press conference," he said.

They held a forum of their own after the newspapermen left.

"You can thank Cartwright for this upset," said Symonds savagely.

"Cartwright?" queried the professor.

"Sorry," Symonds answered. "I forgot that you boys aren't interested in politics. It's plain that Cartwright and Corning—Congressional buddies got together and issued a blast, and the President had to backtrack."

"Walter," said Ortega, quietly, "are you going to tell Joan about the possible result of the fermium bomb?"

"No, I'm not," said Symonds. "If we go out with a loud bang, fine. If not, why worry her. No, let's just keep on our path for the time being. Come on out to the lab and watch time, if not tide, perform for us."

He manages it rather well, the professor noted. That surface carelessness. Ortega says nothing, and they both hope that their attitude will reassure me. How foolish, yet how kind. I've lived my span.

The lab lights were blinding at first. After his eyes became accustomed to the glare, he examined the time machine. The changes seemed minor. Two more of the curious little vacuum tubes had been wired into a circuit. Another coil had been added to amplify the field. Otherwise, it was no different.

"Let's try something heavier this time," said Symonds. He opened a drawer, and peered inside. "Ah!" Joan's kitchen thermometer. I should return my borrowings really. But, not right now."

He placed the thermometer on the

crystal looped dais and switched on the power. Once again the violet haze flickered. Suddenly the dais was empty. Professor Harley drew a deep breath.

"How far, Walter?"

"A week, professor. Hope you're here to see it materialize."

Ortega coughed, and Symonds went on, hurriedly, embarrassedly: "I mean, if you're not lecturing or something."

The phone punctuated his sentence and he picked up the receiver with visible relief.

"Yes? Joan? . . . Your thermometer? Well, I can get it back if you must have it . . . Fat for French fries? Test it with your finger . . . Well, just a minute." Carefully he altered the settings. "Rather a short-lived experiment, that one. We'll bring back her kitchen appliance and use something else." He consulted his watch and checked the dials on the machine, first with puzzlement on his face, then urgency. "Strange, it should be back now."

"Some possible future interference?" hazarded the professor. Ortega did not speak.

"No, that would bring it back automatically, remember," said Symonds, "unless . . . unless—"

"If there is no future—" said Ortega, in choked tones.

Realization, sudden and complete, stood tangibly in the room. Professor Harley found himself winding his watch, his fingers stiff, his whole being numb and detached.

THE END.

BOOK REVIEWS

"The Key to the Great Gate," by Hinko Gottlieb, Simon & Schuster, New York. \$2.75

Science-fiction readers whose souls hunger only for the clatter of space axes or buxom futurean Jane Russells struggling in the grip of nine-armed monsters can get off here and take the next rocket going the other way. Hinko Gottlieb's tale of four prisoners of the Nazi regime in Vienna during the recent war is no space opera, indeed it is not strictly science fiction. Nevertheless, the exploits of that imperturbable fellow Tarnopolski during his four days in the cramped little six by twelve cell are almost sure to startle and interest the more mature science-fiction fan as much as they did Tarnopolski's three cell mates.

Dr. Strauss, the prominent Viennese attorney, finds it necessary to caution the new arrival about his language within thirty seconds after Weichselbraun, the saturnine Nazi floor supervisor, delivers Tarnopolski into the already overcrowded Cell 84, and from there on the events of this absorbing story proceed along a course at least as surprising to his fellow prisoners as it shortly becomes to the Nazi authorities.

There is, for instance, Tarnopolski's habit of producing from his pocket all sorts of objects definitely not on the list permitted Jewish inmates of a Nazi prison in war time. This alone is enough to insure a most unpleasant amount of attention from the floor supervisor, and eventually from the lieutenant, and even the prison commandant, especially since the "objects" include, among other things, a radio, a live rooster, and a grand piano.

Then too, there is the strange and electrifying fate of Dov Tarnopolski's shoe, which achieves a really astonishing velocity during the night, and is promoted to the dignity of a British bomb by the prison authorities, as they try to account for certain damage to the building. And, of course, the drinking bout in the cell, carried on with the aid of liqueur which the prisoners clearly could not possibly obtain, has a most depressing effect on Weichselbraun, whose intelligence is not exactly overpowering.

Aside from the events stemming from the unusual powers of that peculiar man Tarnopolski, the reader will doubtless find the majestic arguments between Dr. Strauss and the chief rabbi of Salonika, the third

innate, both amusing and stimulating, particularly since both men play chess with an equal lack of skill. And as for Tarnopolski's habit of singing loudly or conducting lectures on science in the middle of the night—but exploration of these entertaining sidelights will be more rewarding to the reader who discovers them for himself.

Practically all the action takes place in the prisoners' cramped cell, even to their visit to Tarnopolski's house, yet one could hardly call this a static narrative, or one devoid of breadth, for the prisoners' fund of experience and imagination more than makes up for their restricted physical domain. As to how they accomplish a visit to Tarnopolski's home and workshop without leaving Cell 84, it would be cheating the reader of a deserved pleasure to explain in too much detail. Suffice it to say that the means employed will not strain the bounds of plausibility for regular *ASTOUNDING* readers.

The tale unfolds under the telling of the fourth prisoner, who is enough of a physicist to follow the dissertations of Dov Tarnopolski, although not without limping at intervals, especially when that worthy chooses the sleepest period of the night for his more involved explanations. The narrator and his two fellow victims of Nazi terror, Dr. Strauss and the chief rabbi, have already occupied Cell 84 some weary months when the new prisoner is thrust among them by the brutal

Weichselbraun, but it is safe to say that the ensuing four days before the unaccountable disappearance of Tarnopolski are more crowded with events than all the time that passed before.

It soon becomes known that Tarnopolski is searching for some one who befriended him in Poland while he was doing the work which was to result in his peculiar powers, but it seems likely that this search is terminated by the same Cosmic disturbance which apparently has something to do with the disappearance. At any rate, the final outcome of the hunt never becomes known in the story, which however doesn't interfere in the slightest with the reader's enjoyment.

It is a story blessed with some of the most skillful character drawing this reviewer has seen in recent fiction, a good deal of potent ethical and philosophical ideology, leavened with more humor than can be found in an entire issue of a slick magazine, and enough action and surprises to appeal to even those who yawn over the merely intellectual appeal. Also, the sidelights on minor characters such as the trusty Habershtock, a professional chicken thief known to his fellow prisoners for good and sufficient reasons as The Bishop, and the illuminating insights into the psychology of prisons and prisoners add their share of interest to this rewarding story.

It would be unfair to conclude a review of this book without some discussion of the author, whose

knowledge of Nazi prisons was gained at first hand. Hinko Gottlieb is a Croatian author and lawyer, who grew up in Zagreb, and in his sixty-one years has seen and taken part in many of the violent social and political dislocations which have harassed the peoples of that part of Southern Europe. He was imprisoned by the Gestapo when the Nazis occupied Yugoslavia, was later moved to an Italian concentration camp, and eventually found his way into the Yugoslav underground.

It was during this time with the partisans that his manuscript for "The Key To The Great Gate" was destroyed by the Germans, who found it cached in a cave. The story had been written during a previous interval of escape and freedom, and was reconstructed from memory a year later in Italy. Written originally in Serbo-Croat, it was translated by the author into German, from which language it was rendered into English with notable skill and taste by Fred Bolman and Ruth Morris for Simon and Schuster.

No review of this book would be complete without proper appreciation of the excellent illustrations of Sam Fischer, who has caught the flavor of the whole work to perfection. The picture of the four prisoners, the toilet, and Tarnopolski's mysterious grand piano crowded into Cell 84 is by itself fully as amusing as the pinheaded Nazi lieutenant's search for the hidden spring which he firmly believes will cause it to fold up and disappear. There is

a definite and unmistakable European flavor about the whole book reminiscent of Schweik, "The Good Soldier," as indeed there is in the author's masterly portrayal of the cruelty and stupidity of the Nazi tyranny.

It would be pleasant to record as a final note that the author has at last been able to settle in some tranquil place to enjoy his declining years, perhaps in turning out still other semifantastic tales, but the facts seem imbued with yet another touch of the most exquisite irony. Mr. Gottlieb now lives in Palestine.

L. Jerome Stanton

"Beyond This Horizon," by Robert A. Heinlein. Fantasy Press, Reading, Pennsylvania. 242 pp. Ill. \$3.00.

The gadget story, with a routine plot hung from some more or less scientific quirk, has rightly lost its lead in science fiction, or at least has become more sophisticated. However, in one respect it is still with us in an increasing number of stories in which the jigger is not physical but an imagined variant of human society. This is Utopia without the preaching, probably the oldest and most respectable form of science fiction, and Robert Heinlein is among its most adept exponents.

"Beyond This Horizon," which appeared here in 1942, is Heinlein's first novel in book form with the

exception of the juvenile, "Rocket Ship Galileo"—Scribner, \$2.00. It should be the first of many, for there are even better yarns in the hopper. It introduces us to an oddly advanced, oddly archaic society of planned economy and side arms, somewhere in our future, in which geneticists are strenuously and artfully using their science to tailor-make the best of all possible human strains. Its hero, Hamilton Felix, is their masterpiece and a far from standardized one; his failure to see any reason for carrying on the process of directed matings provides

one element of the plot, which further involves an underground revolution and the personal problems of one or two of his closer associates. But in true Heinlein manner the basic theme of the book smashes through the screen of action only in the closing pages.

The book, as usual with Fantasy Press, is superior typographically. A new artist, Robert Breck, has done the illustrations and A. J. Donnell has contributed one of his best jacket designs.

P. SCHUYLER MILLER

THE ANALYTICAL LABORATORY

Wilmar H. Shiras sent in her first science-fiction story, "In Hiding." I liked it, and bought it at once. Evidently I was not alone in liking it; it has made an exceptional showing in the Lab, here—the sort of showing, in fact, that Bob Heinlein, A. E. van Vogt, and Lewis Padgett made with their first yarns. I have reason to believe we've found a new front-rank author. Incidentally, there's a sequel to "In Hiding" coming up in the March issue.

But the Lab this month shows the following figures, on the November issue:

Place	Story	Author	Points
1.	In Hiding	Wilmar H. Shiras	1.54
2.	Players of Æ (Part II)	A. E. van Vogt	2.35
3.	Expedition Mercy	J. A. Winter	3.32
4 & 5	Tied:		
	Period Piece	J. J. Coupling	3.60
	Love Of Heaven	Theodore Sturgeon	3.60

THE EDITOR.



BRASS TACKS

Pan fried!

Dear Sir:

When I happen to have a spare quarter do you think that I buy nail-polish with it? Do you believe that I buy candy, or go to a movie—a cheap one—or that I even indulge in a long, exciting trolley car ride? No, with that quarter I usually get a science fiction magazine, and I have been spending quarters on your magazine for a countless number of years. I have risked my reputation in college by defending science-fiction in English class as belonging to great literature, and I have established a reputation among my friends as being an expert on rocket-ships, time travel, and probability measurements.

And so, dear sir, I feel that I have the right to criticize the latest issue of *Astounding*—October 1948—for it left me speechless with ire and indignation.

From the cover to page 153 the

magazine offered nothing but the most mediocre stories, ideas, and entertainment in general. But let us not be hasty. I shall tell you in detail what I mean, so that in the future you will know what "the little average woman-on-the-street" wants out of her science fiction.

I think that men are lovely, but I don't think that they belong on the cover of a magazine dressed in nothing but B.V.D.'s. And on top of that looking like a hamy actor about to start reciting a resounding, heroic ballad.

Then, in my own opinion, the serial "The Players of A" is an incoherent, silly story, fit to be put before a ten-year-old adventure fan, but you can't fool the connoisseurs. First of all, it lacks dramatic unity in its development, which presupposes knowledge of Mr. van Vogt's earlier story, which was rightly panned by all critics the very moment it hit the book shops. But why go on? I hate wasting more time on it.

"Unite and Conquer" was all right compared to other stories in that issue, but, of course, it lacked believability, being set so close to our own age, thus enabling the reader to say, "Aha, the fellow is just making make-believe," and settling back with that idea.

All the short stories were absolutely, but absolutely my dear editor, to put it bluntly, terrible. "The Hero" is the kind of story that was written many times before, and all that is new about it are the names of the heroes, and a little twist here and there in the juvenile plot.

The same goes for "School for the Stars," the only thing different about this story is that the plot is even weaker and the artistry is even less apparent than in the above-panned story.

"Muten" was cute. That is the word for it, cute. Now, that kind of story does not belong to a serious science fiction magazine. I read about a lot of talking horses, and the idea that a talking horse may be a "quuten" is really quite clever, and has a lot of possibilities, but what did Mr. Munro do? He tried to knock off a story in a few minutes, it seems, and dished out a kindergarten tale to hard-boiled fans.

"Tiger Ride" also has a clever plot structure, but it is not developed, and it seems that toward the end the author is eager to rush back to his game of golf. No, pardon me, the collaborating authors were probably eager to rush back to their game of golf. Besides, what is wrong with

a belt-servant? I could use one myself, and being freed of all the worries of making a living to get quarters to get your magazine I could just order that belt to make me happy by writing the most scientific science fiction story of them all, and in the meantime let the world go to pot. I assure the authors that I won't mind going to pot in that pleasant way.

I won't discuss the article, because I never read them and consider them a blasphemy in a fiction magazine anyway.

So here is my gripe. Here is part of my martyrdom being expressed in puny words which will never be able to convey to you, most illustrious editor, all the sorrow that I suffered after spending my last quarter. And so here is a warning: after this letter, which explained to you the faults that I found, I expect you to turn out a better sort of magazine or else I will shower your office with stories of my own creation, and will spend my spare time reading my own diary.—(Mrs.) Ursula C. Whitt, 3120 W. Clifford Street, Philadelphia, Pennsylvania.

"In Hiding" was widely and highly praised. We'll hear further from Shiras!

My dear Mr. Campbell:

I have just finished reading two of the most human stories I have ever had the pleasure to read. Both were

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contained in the November issue of ASF. Both had one quality, their humanity was the result of an unhuman — or nonhuman — theme. Both showed, in words better than can be employed by any psychologist or sociologist, some of the underlying failings of the human race.

The first was "The Love of Heaven," by one of the past masters. In my opinion, its charm lay in the original slip made by the being when he said, "I am—regret." I had the feeling that Sturgeon wanted us to feel that he was Regret, personified.

The other was "In Hiding." I herewith nominate this tale to the Scientifiction Hall of Fame. I will never be able to say quite enough for

this story. Of itself, it is worth a year's subscription. I know that I lived the parts of both the psychiatrist and the child. And I am glad that I elected to read that story last, for there is nothing now which can dull the sheer ecstasy which filled me.

If I wax flowery and verbose, you can blame Mr. Shiras for creating a classic. Thank you, Mr. Campbell, for this wonderful treat.

I have a couple of suggestions to improve the magazine. They are not fundamental, for there is no fundamental fault. But it might not be a bad idea to get a little type which will handle the mathematical and scientific symbols used in the

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JULIUS UNGER

Box 35, Brooklyn 4, New York

articles and stories. For example: angular velocity in radians per second is given by a lower case omega, not an upper case W. And angular momentum is a lower case mu, not U. It is unimportant, but I think it would enhance the appearance of the articles.

And I think that it would be a good idea if you were to change An Lab policy somewhat. Do not include the serials in the monthly reports, but make them an annual job, in which you report, say in January, all the serials completed in the previous years. Many, I know, are like me, and do not read the serial until it is complete. Many others do not like to report on the serial until it is done. This throws the odds off on the final issue.

And here is the November An Lab Report:

1. In Hiding
2. The Love of Heaven
3. Period Piece—really ties for second.
4. Expedition Mercy—an excellent story, but outclassed by the others in this issue.

And can't "Probability Zero" come out of hiding now that the war is so far in the past?

And give us *Unknown*. From *Unknown Worlds* just whetted our appetites.

Thanks again for the best issue since Hector was a pup.—Michael J. Keenan, 116 S. Atrisco Road, Albuquerque, New Mexico.

We've got some good stuff coming too!

Dear Mr. Campbell:

Your issues are getting better and better.

That statement may sound old, coming from me, but nevertheless I can not think of anything to say that would fit the case more accurately.

"Dreadful Sanctuary"—this ending was compelling and thought-provoking.

"The Monster"—best Van Vogt in a long time—even better than "The Rull".

(Now the deciding gets tough.)

"Time Trap"—more interesting characters.

"Smaller Than You Think".

"Dawn Of Nothing"—even the last is a darn good story by a good writer.

Front cover: excellent. Interior artist: Cartier, Orban, Timmins—as listed on the contents page.—Rosco E. Wright, Route 2, Box 264, Springfield, Oregon.

Rhine's careful work seems to demonstrate something—though even he doesn't claim to know just what. As such it is legitimate background for science fiction.

Dear Mr. Campbell:

Something for the Complaint Department: van Vogt's "Monster," although an enjoyable story, is part of a regrettable trend toward magic

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in what you claim to be science fiction. I don't like to use harsh words about one of your best writers, but this seems to me rather a cheap way to do business.

Proper science fiction, I've always understood—for about twenty years—is based on reasonable extrapolation of present knowledge. (It should therefore not try to peer too far into the future.) Writers lately tend to go hog-wild, blithely cavorting in a make-a-wish fairy world. I submit that Rhine's dubious experiments form inadequate basis for all this fantasy.

An *occasional* such cotton-candy story may be agreeable, but it doesn't take much to sicken one. How about a more wholesome diet, Doc?

And how about some more from that promising new writer, Wilkison—this time without the mysticism?—R. C. W. Ettinger, 4231 Monterey, Detroit 4, Michigan.

Note: Bob Heinlein has promised us a yarn soon!

Dear John:

At last technological development has caught up with the science-fiction artists and illustrators. I am not referring to anything else but Paul Orban's spaceships. Note illos for "The Rull," et cetera. Also the filler cut of the multi-windowed ship you use frequently.

The only sad thing about this de-

velopment is that evidence lends support to the extra-mundane origin theories of Charles Fort and other dubious adherents, among them members of our own genre of sf authors—needless to say, with the recent crop of wacky theories.

First came the "flying saucers", or "disks". Perhaps Phil Nowlan and Dick Calkins could be credited with the idea and cartooned version of the flying disk much, much earlier in the Buck Rogers strip. Well, Kenneth Arnold of Boise brought science-fiction up-to-date with the first observation of the flying disks.

And finally, sf has been caught up with in the form of Orban's ubiquitous, eternal spaceship.

On Saturday, July 24th, two EAL pilots, Captain Clarence Chiles and Co-pilot John Whitted, on the Houston-to-Atlanta-to-Boston flight, at 2:45 a.m. (CST), in their DC-3, reported a wingless aircraft that passed them at tremendous speed.

They were flying at five thousand feet in the regulation CAA designated airway when they spotted the aircraft, it being almost in their line of flight, headed in the opposite direction, towards Mobile and New Orleans. The DC-3 was about twenty miles southwest of Montgomery, Alabama.

Captain Chiles related: "I hate to say this, but it looked just like a Buck Rogers rocket ship. If I see anything else like this, I think I'll have to quit flying. We were flying along on the regular airway when we saw ahead and slightly above and

to our right what appeared to be a tremendous jet of flame. It flashed down and we veered to the left and it veered to its left, and passed us about seven hundred feet to our right and about seven hundred feet above us. Then as if the pilot wanted to avoid us, it pulled up with a tremendous burst of flame out of its rear and zoomed up into the clouds. Its prop-wash or jet-wash or rocket-wash, take your pick, rocked our DC-3." The pilots describe the ship as about one hundred feet in length, and about four times the circumference of a B-29 fuselage. It had *no* wings. A twenty-five-to-fifty foot red flame was shooting from the rear, and there was a blue, fluorescent glow under the whole length of the fuselage. Captain Chiles further related, "It had two rows of square windows, apparently from an upper and lower deck, and the interior was brilliantly lighted. We saw no occupants. I'd say it was going between five hundred and seven hundred miles an hour."

The following Sunday morning the story appeared in various Georgia papers, the Atlanta *Constitution* carrying sketches of the ship by both men. The singularly remarkable thing about the incident, is that the sketches were remarkably similar to Orban's ships.

Well, these things happen every day so to speak. The alarming fact is that no matter what the theory that explains the phenomenon, as infinite numbers of theories do as

long as it is a workable theory, the *PHENOMENON STILL REMAINS*.

I guess I'll have to go back through Charles Fort again.

As for the contents of the August issue.

The cover takes my breath. Canedo is too, too utterly para-, or hyper-symbolic. And no story titles to mar the front either. I guess you have finally decided that ASF sells itself on its own merits rather than having to resort to standard pulp tactics. Psycho-dynamics applied to the masses.

Your editorial—simply superb. Let's have one tying in Non-Newtonian system of action-by-contact, and the standing confused controversies over quantum mechanics in giving us readers the low-down on latest discovered subatomic particles and their relation to our present systems, with probable effect on the classical set-up.

Oh well, such an evaluation would be quite a thesis for graduate work much less asking it for the price of two-bits.

Oh yes—the stories. "The Monster" takes first place with the tag van Vogt placed well before the denouement—"This race has discovered the secrets of its nervous system."

"Time Trap" grabbed second, I like Harness' new words—*Hard-times* (sterechronia).

"Dreadful Sanctuary" has to show. I just couldn't resist his description of the rockets' lifting for

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their maiden voyage. Thank you Eric and John. After all, everyone didn't get to see the lift of a V-2 at White Sands. Or maybe I'm just a dreamy-eyed fool. (I'll bet I have company on this one.)

"Smaller Than You Think" was fourth, with "Dawn of Nothing" hitting fifth. Quite an issue. The liquor ads have been bounced and the fans are now happy with the new program of the *Fan-ad*.

When do we get some of the unwritten *Future History* series or does Bob like three to five cents a word better than honor and tradition? However, ya' gotta eat!

To A. E. van Vogt—"Let's have an Asimov-type yarn concerning

corruption of the Galaxy with the unique system of Null-A."


Time for a Kuttner serial.

Unknown. *Unknown. UNKNOWN.*—W. H. Entrekin Jr., Americus, Georgia

Sorry, but we can't help Canadian science-fictioners. It's against their laws for us to accept any Canadian-bound subscriptions, even as gifts from Americans.

Dear Editor:

From front to back, the September issue of *Astounding* rates high. But the reasons are somewhat differ-



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ent this time, and I thought maybe you'd like to hear why.

Couple of days ago I got hungry enough for science-fiction to hike down to the only secondhand bookstore I know of in Cleveland that sells back copies of magazines to see if I could find something to read. I had remembered that years back when I first started reading SF, a fellow could cull many a good issue among the hundreds of back issues available. But when I got there, I could find only a few back issues of *Astounding* mostly late '47 and early '48 issues—which I had at home anyway—and about forty copies of competing magazines, mostly early '48. Well, I bought five magazines and came home to read.

I don't want to go into all the harrowing details. It seems sufficient to say that when I received the September issue yesterday, the comparison was ridiculous. *Astounding* surely has come a long way in the past ten years.

The cover was appealing except for the fact that it took me quite a time to discover what it represented. Maybe I wouldn't have noticed it so much but for the fact that my wife asked me what that round thing on the cover was. I told her that I thought the explanation would be on the contents page, and of course, when we looked, it wasn't there. Hiding it at the tail end of the Richardson article seemed illogical to us.

In order of preference, the stories rate as follows:

1. "The Catspaw"
2. "Dreams Are Sacred" and "The Great Air Monopoly" tied for second place. "Dreams" would have been better than a tie if it hadn't dragged in an author to provide the humor. Not that I have anything against authors per se, but rather that I seem to have read a number of variations on the theme.
3. "The Gorgons": A nice short
4. "Dance of a New World": Average SF
5. "Inheritance": An incident expanded. Failed to entertain. And besides, I have read Dunne.

The article was as good as usual. I find that this particular section of the magazine fulfills a very definite craving on my part to know more about what is being done in the world of theoretical science.

One of the things I enjoyed most in this issue was the Brass Tacks section. The letters seemed unusually clear, concise, and interesting; particularly Philip Good's finely balanced letter concerning Korzybski and his work. Any mention of the Non-Aristotelian system has the immediate effect of bringing me up sharply to attention. I still remember the absolute feeling of awe that fell over me the first time I read "Science and Sanity" by the good Count.

Isn't there any way these guys in Canada can get copies of ASF, legally, that is? As a Christmas gift, for instance?—John W. Downing, 11601 Kelton Avenue, Cleveland 6, Ohio.



CHRISTMAS TREE

BY CHRISTOPHER YOLD

*The pitcher too often to the well doesn't return—and
the man too often to the Moon may be marooned there.
And then a tree can be a precious, bitter thing—*

Illustrated by Timmins

The skipper cushioned us in nicely. I had my eyes on the dial the whole time and the needle never got above four and a half G's. With

a boat like the *Arkland* that was good; I've known a bad pilot to touch seven G's on an Earth landing. All the same I didn't feel so hot.

Young Stenway was out of his cradle before the tremors had stopped. I lay still a moment while he stood over me, grinning:

"Break it up, Joe. Dreaming of a pension?"

I got up with a bounce and landed him a playful clip that rocked him back into his own cradle. There was normal gravity underneath us; the feeling of rightness you know in your bones and muscles no matter how long you've been away. It was good to feel myself tough still.

"So this is Washington. What day is it?" Stenway asked.

"You revert to type quick, kid. How should I know what day it is? I'm only a visitor."

He grinned, flushing a little, and went over to the multiple calendar. I saw him fingering it, his face screwed up.

"Friday. Say, Joe, if we take more than fourteen days on the turn-round, we'll make Christmas here."

"If we take more than ten days on the turn-round," I shot back, "the whole Board of Directors will commit gory suicide. What's worrying you?"

He grinned lopsidedly, and went out in a hurry. I was a bit sorry for him. He'd done less than a year in the Service. Things weren't the right pattern for him yet. He probably thought some of us were tough eggs. But we had to ride him down now and then for his own good.

I went along to see Louis. He'd been in space only a couple of years

less than I had, and we'd both been with the *Arkland* since she was commissioned eight years before. But we didn't see each other much, working on different shifts and pretty nearly at opposite ends of the boat. I found him in the mess, sprucing up. He called out:

"Hello, Joe. You still with us?"

"Why not?"

"Borrowed time—just borrowed time."

"Louis. Do me a favor."

"Sure, Joe. Any little thing."

He put down a hairbrush and started powdering his face, overlaying the finely raveled seams of red that told he'd been out in vacuum. I couldn't understand that myself. It made you a bit unusual on Earth, it stamped you as a spaceman, but who'd be ashamed of that? Still, I've never been branded myself, so maybe I shouldn't talk.

"You handling the loading for the next trip, Louie?"

He pressed the powder in with his fingertips, and nodded.

"I want to get something on board."

"How big?" Louie asked.

I shrugged lightly. "About five feet long. Maybe two feet across, at it widest—when it's tied up."

Louie jutted his chin out and flicked a patch of black velvet across his face. He spoke through his teeth:

"What about the Pentagon Building, if you want a souvenir?"

"What would I do with the Pentagon Building?"

Louie turned round. "Look, Joe, you know how things are. You know the cost of space-freighting. There isn't a quarter-ounce of cargo weight that isn't accounted for. What do you want to fit in, anyway?"

"This is for old Hans. I thought of taking him a Christmas tree."

Louie didn't say anything for a moment. He had brushed the powder well in, but you could still see the crimson network underneath. At last he said:

"O.K. Get it up here the night before we blast. I'll fix it for you."

"Thanks, Louie. When will that be, by the way? Have they told you?"

"Nineteenth. Now go and raise hell for nine days. But don't forget the Medical tomorrow."

I looked at him sharply, but he was brushing in another layer of powder. Medical was a routine, always taken between eighteen and twenty-four hours after cushioning. The doctors knew why, or said they did. It wasn't the sort of thing you'd forget. But it wasn't worth taking him up on it.

The *Arkland* touched at Washington every fifth trip. I knew quite a few numbers and had my usual haunts. There was a somber moment once when one of the girls relaxed and the wrinkles stood out, but it passed. There's always the younger generation. I let it get round to the day before blasting before I dropped in on the company's office. They've got a block of masonry on Roosevelt Boulevard

that's bigger than Luna City. Welfare in on Floor 32. It makes me airsick to look out of their windows.

There was a cute little blonde at the desk and it occurred to me that next time I might contact Welfare at the beginning of a furlough. She looked as though she could get through my back-pay as well as any.

I said: "You can help me out. I want to buy a Christmas tree."

She looked surprised and rather disappointed, but she was business-like. She waded through a pile of directories like a terrier after rats.

"Christmas trees," she said. "Your best bet is the Leeclyff Nurseries. Mr. Cliff. About fifteen miles out. You can pick up a gyro on the roof."

"Don't tell me there's a roof on this thing," I said.

She just smiled very nicely.

"Keep a week free next November," I told her as I turned to leave. "I'll be back."

The gyro did the trip in just over ten minutes. Where it put me down you wouldn't guess such a place as Washington existed. One way there were a lot of low sheds and a few glasshouses. The other way there were just fields and fields of plants growing. I realized that it was more than ten years since I'd been outside a city on an Earth furlough. You get into habits. For the first time it occurred to me that I might have been missing something.

They had phoned Mr. Cliff I was coming; "Good Service" is the Com-

panty's motto. He was waiting when the gyro touched. A little round fellow, with a look as though something had surprised him. He said:

"Major Davies, I'm delighted to see you. We don't see many spacemen. Come and see my roses."

He seemed eager and I let him take me. I wasn't breaking my neck to get back into town.

He had a glasshouse full of roses. I hesitated in the doorway. Mr. Cliff said: "Well?"

"I'd forgotten they smelled like that," I told him.

He said proudly, "It's quite a showing. A week before Christmas and a showing like that. Look at this Frau Karl Druschki."

It was a white rose, very nicely shaped and scented like spring. The roses had me. I crawled round after Mr. Cliff, seeing roses, feeling roses, breathing roses. I looked at my watch when it began to get dark.

"I came to buy a Christmas tree, Mr. Cliff."

We left the rose house reluctantly.

"Christmas on Earth for a change, Major Davies?"

"No—Luna City. It's for someone there."

He waited for me to go on.

"A guy called Hans," I said. "He's been nearly forty years in Luna City. He was born in a little village in Austria. Halfway up a mountain, with pines all round and snow on them in winter. You know. He gets homesick."

"Why doesn't he come back, Major Davies?"

It's always a shock when people show how little they know about the life you lead, though I suppose you can't blame them. The exciting parts are news—spacewrecks and crashes and mad orbits—but the routine's dull. I suppose there are some things the company doesn't pass on to Publicity. Not that there's anything they're ashamed of—they just don't talk about such things.

"Mr. Cliff," I said, "the doctors have it all tabbed. It's what they call cumulative stress. You can't bring a boat in or push her off without an initial strain. It varies with the planets, of course. For Earth, with an average sized vessel, the peak's about five or six gravities."

I flexed my shoulders back, breathing this different air.

"You've got to be tough physically," I went on, "but even so it tells. It's the heart chiefly. They give you a warning when it begins to flicker; you can drop out then with a pension. Of course there are some who can carry on. They're used to the life, and—"

"And—?" prompted Mr. Cliff.

"There's a final warning as well. They check up on you after each trip; vet you for the next. Then one time it's just plain No. You can argue, but the answer's No. Another take-off would finish you. So they say. There's no way of testing it; they just don't let you on a boat after that."

"They're very considerate, Major Davies."

I laughed. "Oh, very. The only

thing is—they check you each landfall. Hans got his final warning at Luna City.”

“Oh.” Mr. Cliff bent his head to smell the red rose in his coat. “How long ago did you say?”

“Hans is an old man. Over seventy. Generally you get your first warning when you are about thirty.”

“And how big is this Luna City?”

“That’s easy,” I said. “It’s in the guide books. A couple of blocks long by a block wide. It goes underground a bit as well.”

“That’s terrible, Major Davies. Forty years like that. No trees, no birds— And young men know that and still take the risk? I can’t believe it.”

It was an old story but I’d never felt myself getting so mad about it before. I reined myself in. He was a nice old guy.

“You don’t understand, Mr. Cliff. There’s something in the life. And sometimes there’s more than five years between first and final warnings. One guy went ten. There’s always one more trip that’s worth making before you settle down for good. They don’t recruit spacemen who give up easily. And you may always strike lucky and get your ticket at this end.”

“When did you get your first warning, Major Davies?”

I flushed. “Three years ago. So what? Now this matter of the Christmas tree, Mr. Cliff—”

“I’ll show you. The Christmas tree is on me. Please.”

He led me away to show me the

fir trees, and the scent of roses gave way to a rich piney smell that made me remember being a kid, and holidays up in the lakes. Mr. Cliff finally broke the silence:

“I’ve been thinking, Major Davies. I’ve got a proposition that may interest you—”

I didn’t see Louie when the tree went on board; one of his boys handled it. There wasn’t a sign of any of the company police around, and I guessed Louie was distracting them with a friendly game of poker. Skinning ‘em too, if I knew Louie. I didn’t see him until the end of my second shift on the trip. The radar screen was a beautiful blank; it was a clear season for meteors. Louie was lolling in front of it reading a book.

“Louie, I always knew I slipped up when I majored in Nav. Do they pay you for this?”

Sometimes there’s ill feeling about the large stretches of easy time radar-ops manage to corner, but Louie knew I’d been in space too long for that. Until the automatic relays smarten up a lot there’s got to be a man on the screen. And the company doesn’t give time away; the radar section handle the quarter-mastering, too. Every third furlough they lose two days.

Louie grinned. “I’ve got a weak heart. Didn’t you know?”

I tossed him a cigarette. “Thanks for getting baby on board. What did you throw out—gold bars?”

He shook his head. “Just my own

brand of math. If that orbit you've laid us turns out bad enough, we'll hit the sun approximately ten minutes sooner than we would otherwise. And I've got to pep my meteor deflection up by three thousandths of a second. It's a big risk."

"My orbit's good," I said. "I'll never lay one better. Next trip I'm going to lay the tightest Moon-Earth orbit since Christiansen came in on the Leonids. After that you needn't worry about my failing eyes, Louie."

"I'm glad, Joe. I always knew you had sense. I'm dropping out the moment they give me a hint. It's not worth it."

"Yes, Louie, I'm really going."

"You'll miss it, Joe, but you'll get over that. You'd have to anyway before long."

"It's out in the country, Louie. A nursery. Growing plants, all kinds of plants. Fir trees and chrysanthemums and daffodils—and roses at Christmas. And the moon's no more than something you plant by. I shan't miss anything."

"You're lucky, Joe. That's what it is—you're lucky."

We cushioned at three G's and I felt it again; a long ache inside my chest as though my heart and lungs were tied up with strings and someone was twisting them nice and slowly. It was all right after a few minutes and I got up, light and active under Moon gravity. I wasted no time getting through the main lock. I looked for old Hans amongst those who stood by, but there was no

sign of him. I called Portugese, who runs the grog shop.

"Portugese! Where's Hans? I've got something for him."

He came waddling over. With a bulk like his I could almost understand why he had chosen Luna City. He shrugged, lifting everything—hands, shoulders and eyebrows.

"Too late now," he said. "He died just after nightfall. We're taking him out in a few hours."

In Luna City there are no extras. You don't waste anything that has to be freighted a quarter of a million miles; and that includes oxygen. When men die there, their bodies are kept until nightfall when, for three hundred and thirty-six hours, darkness freezes into rime the last traces of the Moon's atmosphere. Some time during the night the body is taken out in a caterpillar and committed, with duly economical rites, to some cleft in the antique rocks. With the sunrise the thin air melts, the gray lichen runs like a sickness along the crater bottoms, and in that microscopic jungle the minute lunar insects awaken to fight battles as real as Tyrannosaurus ever knew. Long before the crater shadows lengthen towards sunset the cleft is empty again. No flesh, no hair, no scrap of bone escapes them.

Portugese drove the caterpillar out through the air lock. Louie and I sat behind him with old Hans' body, covered by a sheet, on the floor between us. We were silent while the little truck jolted on its metal

tracks across granite and pumice and frozen lava. And I don't think it was the death inside that silenced us; we had liked old Hans but he had had his time, and was released now to infinity from the narrow confines of Luna City. It was the death outside that quieted us, as it quiets any man who goes out among those age-old crests and pinnacles, under those glaring stars.

Portugese halted the caterpillar on the crest of a rise about midway between Luna City and Kelly's Crater. It was the usual burial ground; the planet's surface here was cross-hatched in deep grooves by some age-old catastrophe. We clamped down the visors on our suits and got out. Portugese and I carried old

Hans easily between us, his frail body fantastically light against lunar gravity. We put him down carefully in a wide, deep cleft, and I turned round towards the truck. Louie walked towards us, carrying the Christmas tree. There had been moisture on it which had frozen instantly into sparkling frost. It looked like a centerpiece out of a store window. It had seemed a good idea back in Luna City, but now it didn't seem appropriate.

We wedged it in with rocks, Portugese read a prayer, and we walked back to the caterpillar, glad to be able to let our visors down again and light up cigarettes. We stayed there while we smoked, looking through the front screen. The tree

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stood up green and white against the sullen, hunching blackness of Kelly's Crater. Right overhead was the Earth, glowing with daylight. I could make out Italy, clear and unsmudged, but farther north Hans' beloved Austria was hidden under blotching December cloud.

We didn't say anything. Portuguese squeezed out his cigarette and started the caterpillar up, turning her round again towards Luna City. We ran into B lock, and Portuguese stabled the truck and came out again to join us. He put his fat arms around our shoulders.

"Come on, boys. Always a drink on the house after a burying party."

"Medical first, Portuguese," Louie said. "We'll look in afterwards. Keep the rum hot for us."

We saw him glide away, and turned back ourselves towards the Administration Building. The others had been through the Medical while we were out, and we had a doctor each without any waiting. We sat in the anteroom afterwards, waiting for them to write our cards up before we could collect them. At last the call came through on the speaker:

"Major Davies. Lieutenant Enderby. Cards ready now."

Louie got his first. He looked at the big blue stamp on the front—FIRST WARNING. He grinned.

"We'll go out in harness, Joe. Any chance of a third partnership in that flower business?"

I didn't say anything. I could

see my card before the doctor gave it to me. I saw the red star splashed on it, and I'd seen too many of them not to know what it meant. It was the mark of the exile, the outlaw who had waited too long to get out. It was the beginning of such a story as the one whose end, forty years later, I had witnessed in the lee of Kelley's Crater under the mocking globe of Earth.

"This is my last trip," I told the doctor. "When we hit Antwerp I'm retiring."

He shook his head. "I'm sorry."

"I don't care if it's a million-to-one chance, Doc. I'll take it; and no hard feelings if it doesn't come off. I'll sign any disclaimer the company wants."

"It's no good, major. You know the regulations. These things are too foolproof now. We're not allowed to let you commit suicide."

I knew it was no good, too. Louie had gone. We all knew better than to stick around when someone got the red star. I had time to look at the doctor. He was very young and didn't look very happy. I guessed he hadn't handed out a star before.

"It could be worse, major. It could have been Phobos."

From the top level in Luna City you can see the sky; at night the stars and the softly glowing Earth. Down to the west Sirius blazes over Kelly's Crater. I've been up here for hours watching them.

I keep thinking I can smell roses.

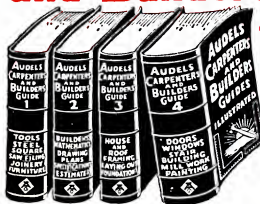
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